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WE have this week to chronicle the collapse of no less than three buildings, with loss of life in two of the cases. The most fatal catastrophe occurred in Texas, where a three-story brick hotel, at Greenville, fell-in about midnight, crushing or burning to death thirteen persons. No explanation is given of the occurrence, and we must probably attribute it to the weakness of the structure. The next accident happened in Rochester, N. Y., and seems to furnish a valuable illustration of the danger of building heavy walls in cold weather. The building which fell was a five-story warehouse, twenty-two by one hundred and twenty feet, on the corner of State and Church Streets, which appears to have been in process of remodelling. A new brick wall had been built on the long side, which fronted on a street recently opened, and the foundation of this wall is said to have been of small stones, not well bonded, and laid in weather so cold that the mortar froze immediately after the stones were set in place. The first two feet of this wall was laid in "water lime," but for the rest ordinary lime was used. The sand for the mortar seems to have been of inferior quality, but whether it was clayey or loamy, or simply too fine, is not clear. The brick wall above the foundation must have been laid in cold weather, and was probably of rather inferior materials. The beams were simply laid into the party-wall, without anchors. With such construction it is not surprising that the warm weather of spring should have softened the mortar, which had been subjected to almost continuous freezing weather for five months, so that the wall, settling outward as walls do under such circumstances, and not being held to the adjoining building by the anchorage of the beams, pulled the upper timbers out of their bearing in the party-wall, allowing them to drop, and precipitating the ruin of the entire structure.

NO one but an expert can fully appreciate the dangerous character of a piece of construction like this, in which the three worst difficulties of ordinary practice were present at once, and seem not even to have been understood. Few problems give a well-trained architect or builder more anxiety than the erection of a long and narrow building upon a corner lot. The wall forming the long side is subjected to conditions far less favorable to stability than those affecting an ordinary party wall, which is held on each side by the beams of every floor, and should be built with special care, and made of sufficient thickness to stand safely almost without anchors, although it should be anchored at every opportunity to the neighboring walls. In the Rochester case all these requirements seem to have been violated. The exposed wall was of great length,—one hundred and twenty feet,—and probably at least sixty feet high; and so far as can be learned from the accounts, was not strengthened by any cross walls. Its thickness, then, for stability independent of any assistance from anchors, should be by Rondelet's rule, about four and one-half feet at the ground, diminishing by successive offsets to the top. If it had been strongly anchored to the party-wall, which, by the way, is a difficult matter in building alongside an old wall, this thickness might be somewhat diminished, but, as the evidence shows, there was no tie of any value, and the wall stood practically alone. Its thickness, however, instead of four and a half feet, was apparently less than half that, for we are told that the foundation, of small rubble, was only two and two-thirds feet thick. Again, the mortar of the wall was not only poor, but, as usually happens with masonry laid in cold weather, did not adhere to the bricks, which were taken from the ruins as clean as when they were laid; and for all practical purposes might as well have been replaced with sand, which would at least have had the advantage of not softening on one side in the sun and allowing the wall to bend over.

THE third collapse was in Chicago, and the account of it conveys a lesson of a different kind. The Champion Reaper Company of that city had just finished a large, five-story brick storehouse, and had placed some of its heavy machinery on the upper floors, when the wooden cap of one of the posts carrying the second floor, strained beyond endurance by the pressure, split, allowing the whole weight above it to drop; and the momentum acquired by the load in its movement of a few inches was sufficient to carry away everything beneath it, and throw the whole mass into the cellar, tearing out the walls at the same time. So far as appears from the description, the building, although cheap, was not unskilfully designed, and wooden posts with bolster caps, although not reliable under severe strain, are very commonly used in such cases. The failure seems to have come from the overloading of the floors with goods which probably neither architect nor owner thought would be stored there; and the moral to be drawn from the occurrence is that neither owners nor architects ought to take any chances in regard to such things, or allow the safety of their property or reputation to depend upon the resistance of a shaken piece of wood, or the discrimination of a porter.

TWO or three weeks ago the National Theatre in Berlin was destroyed by fire, fortunately without loss of life. There was no performance going on, and the metallic drop-curtain was down, but proved to be useless, the flames from the stage passing immediately around or through it, and setting fire to the proscenium boxes, and thence to the remainder of the auditorium. Up to the present time, the use of metallic curtains for keeping fires on the stages of theatres from spreading into the auditorium does not seem to have been very successful. Such curtains are heavy, noisy, and liable to stick in their grooves, or give trouble in other ways; and until better modes are devised for rendering the decorations of the stage incombustible, or of extinguishing them by automatic sprinklers if ignited, thin metal screens cannot be depended upon for anything more than the feeblest resistance to a fire.

THE misfortunes of the contractors for the Indiana State House seem to have culminated in an open breach between them and the State House Commissioners. The appeal of the contractors to the Legislature for an increase of the amount to be paid them, from sixteen hundred thousand dollars, the original contract price, to two million dollars, was rejected by the Legislature before its adjournment, and the Commissioners have therefore no alternative but to compel the performance of the agreement as it stands. Unfortunately for themselves, the contractors seem to have undertaken to resent the decision of the Legislature, and instead of carrying on their work vigorously, keep, it is said, only a few men in the building, with the intention of making a show of fulfilling their contract, which will give them a pretext for resisting in the courts the expected entry of the Commissioners for the purpose of resuming possession of the building. If they should really undertake to carry out such a plan, the skill of the Commissioners in drawing contracts will be tested, as well as their efficiency in supervising work. The prejudices of a jury would probably be all on the side of the contractors, and any obscurity of expression in the articles of agreement, or any doubtful circumstance in regard to the prosecution of the work, would be interpreted in their favor, so that a contract which proved to be clear and explicit enough to leave no possible question as to the intentions of the signers would reflect credit on those who

drew it, however unpleasant it might be for one of the parties to find themselves bound by it. It is suggested that the cancelling of the agreement with the present contractors, and the preparation of new agreements for the completion of the work, will cause much loss of time and money to the State; but the Commissioners are so familiar with the building that new estimates ought to be easily obtained and accepted, while the percentage reserved from the payments to the old contractors, which they will probably forfeit under their agreement, will serve as a margin to cover such increase in the prices of labor and materials as it may be necessary to provide for in the new contracts. The matter is, however, complicated by the failure of the Legislature before adjournment to give specific authority to the Commissioners for making further contracts, and it is doubtful whether it may not be necessary to suspend operations completely until it assembles again next winter.

A NUMBER of the older artists in New York have formed an association, to be called the American Art-Union, with the object of encouraging the fine arts in the United States, and for this purpose a kind of travelling exhibition has been organized, by which a collection of pictures is to be carried from city to city, under the direction of competent persons, who will display it in suitable places, and make sales when they can, at a commission of ten per cent, obtain new pictures to replace those sold, and return unsold pictures to their owners at the end of the season. The motive for the formation of the association is said to be the neglect with which the picture-dealers of New York treat the works of native artists, in comparison with those of foreigners, which are supposed to sell at a greater profit than the others. We wish we could say that the prospect of the development of the arts in America through this new association seemed to be very promising; but a peripatetic picture-show from which the best works are continually withdrawn by purchase would seem to be rather a meagre affair, and it is at least possible to imagine that such a body might work with a nobler impulse than the desire to get the better of the picture-dealers. With all respect for American artists, it is certain that the dealers would not be able to sell French and English pictures here at better prices than American unless their customers were willing to pay more for them; and the picture-buying public has become now sufficiently discriminating to take what it likes without much regard to advice as to what it ought, through patriotic or other motives, to prefer, or at least to purchase.

AN important work has been undertaken in Newport, R. I., for improving the bathing beach, which, although in itself clean and beautiful, terminates in an expanse of mud and marsh. This marshy ground is to be reclaimed, if the project is carried out, by dredging out the mud from the lowest portions, which are now exposed at low tide, and spreading it upon the higher parts, forming an embankment which can be covered with grass, and used as a promenade. The portion of Newport adjoining the beach is held by wealthy owners, including two land-companies, and the investment necessary for carrying out the scheme would probably be a profitable one.

AN interesting series of tests of structural materials is to be made at the Exposition of Railway Appliances, to be held in Chicago during the present season, and the managers solicit specimens of materialsfor trial. The various forms in which wrought iron and steel are commonly used are, in particular, to be submitted to thorough examination, and it is to be hoped that data will be obtained for calculation more reliable than those now in use. Among other things, an investigation is to be made into the effect of upsetting iron rods for bolts and ties, and a prize will be awarded to the manufacturer of the best rod of the kind. On this subject there is much diversity of opinion, the old idea, that the upsetting of a rod is advantageous, being now seriously called in question. The *Iron Age*, in inviting attention to this test, mentions that Professor Vose, of the Massachusetts Institute of Technology, once endeavored to collect information on the matter by asking the opinion of various bridge-builders and iron-workers; but received replies so conflicting that nothing of value could be deduced from them. For example, he was informed by a firm of iron manufacturers that the rods from their establishment were not injured in the least by upsetting; while an engineer, who obtained his bars from this very establishment, wrote that he found them so much injured by the upsetting that he had to have the ends cut off and new ones welded on.

THE definite track for the Panama Canal, after all the preparation of the last two years, has only just been marked out upon the belt of clearing which has been made across the Isthmus, but active preparations are in progress, and about eight thousand men are now engaged in excavating the great trench. It is said that so far about twenty-six millions of dollars have been spent on the work, but it is hoped that a hundred millions more will complete it. By the final route most of the trench will be less than fifty feet deep, but for about ten miles of the way the depth will range from one hundred to four hundred feet. Each foot of progress in such a cutting as this involves the removal of thirty-four hundred cubic yards of earth and rock, and the cost of a mile at this rate can be calculated by curious persons for themselves. Besides the excavation of the canal, there are many auxiliary works, such as the construction of the harbors at either end, the damming of the Chagres River, and so on, which will absorb a great deal of money. On the whole, the prospect seems to be that the cost of the work will exceed the estimates, but with energy and economy the amount available may perhaps be used to bring the canal so near completion that the remaining sum needed will be easily obtained.

ACCORDING to the Boston *Herald*, a modification has been made in the original plan for the Panama Canal, and instead of excavating the trench to the sea-level, so as to permit the towing of vessels directly through it, from sea to sea, the present plan contemplates eight, or perhaps ten, locks. This will reduce the cost of the work enormously, and with such modification the construction of the canal will be a comparatively easy matter. One consequence of the substitution of a less ambitious scheme for the hardly practicable project of a sea-level canal will probably be the silencing of the promoters of rival canals, who have made a good deal of capital out of the extravagant and impossible plan first contemplated. Although a canal with ten locks is a much less magnificent piece of engineering than one without them, it is, other things being equal, a better piece of property than one with twenty locks; and as the Panama route will be in any case the shortest and most quickly traversed, it is likely, if the rate of charge for tolls can be kept down by an economical construction, to have the preference over all others.

A GREAT advance has recently taken place in the price of stock in the Keely Motor Company, and preparations seem to be making for another display of the powers of the mysterious agent. A few days ago a notice was published inviting the stockholders to visit the workshops of the company in Philadelphia, "to view the progress made upon the new engine now in course of construction." The "engine" appears to be a locomotive, of which we have before had some description, but we are enabled to add, from the testimony of a visitor, that besides a steel shaft, ten feet long, and weighing fifteen hundred pounds, the machine is to comprise ten "vibrating tubes," weighing one hundred and fifty pounds each, and a "disc," weighing six hundred pounds. The "generator," in which the motive power is developed, is said to have been tested at a pressure of thirty-two thousand pounds to the square inch. How this pressure was obtained does not appear, but we learn that it has been actually measured by the gauge, so we must be content to believe without asking questions. No drawings have yet been made for the truck of the locomotive, but this would seem to be a detail of comparatively little importance, since a machine capable of exerting a force of thirteen hundred tons to the square foot hardly needs wheels to enable it to go over or through most geological formations known to science. The New York *Commercial Advertiser*, in a long article upon the subject, gives an illustration of the motor, together with an explanation of the principle upon which it depends. From this it appears that "vibrations are produced" in the interior of the machine "by the theory of interatomic ether acting upon molecular construction," and this "creates a disturbance of equilibrium so as to produce a pressure of one hundred tons to the square inch." How the interatomic ether is got at and set at work upon the molecular construction does not seem quite clear, but Mr. Keely explains that "the force is in the vacuum, because the power which is to be liberated is greater than the power behind it." In another place he adds that "Vibration is a difficult thing to define if we speak of it theoretically;" which leads us to suppose that he generally speaks of his machine theoretically.

WATER-CLOSETS. — IX.

TYLOR'S VALVE-CLOSET. — Two prominent English firms manufacture valve-closets in which the valve-chamber or receiver is formed in one piece with the trap, the combined trap or receiver being placed above the floor-level. J. Tylor & Son, London, claim the trap above the floor as a novelty in their valve-closet, which was invented in 1874, and improved in 1876–1878. The bowl is connected with the receiver by small set-screws. The space between the bowl and the flange is filled with putty or a cement of white and red

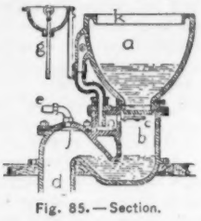


Fig. 85. — Section.

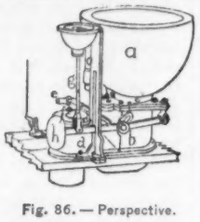


Fig. 86. — Perspective.

Tylor's Valve-Closets.

a, Bowl. *b*, Trap and receiver. *c*, Valve. *d*, Entrance to soil-pipe. *e*, Vent-pipe. *f*, Removable cover for hand-hole. *g*, Hand-pull. *h*, Weighted lever. *o*, Overflow.

lead or some similar composition. From the different illustrations it may be seen that this is a common mode of connecting the bowl and receiver. The receiver is made of galvanized, or, more properly speaking, zinc-coated iron, and the valve, when open, closes the mouth of the overflow trap, thus, the inventor claims, keeping filth from entering the overflow, and at the same time preventing siphon action from taking place. The trap has a small box cast on the part back of the valve, into which the overflow-pipe runs, and dipping below the water-line it forms a trap.

Fig. 87.

Detail of Valve. — Tylor's Closet.

a, Bowl. *b*, Receiver. *c*, Valve. *e*, Metal-seat. *f*, Leather or rubber.

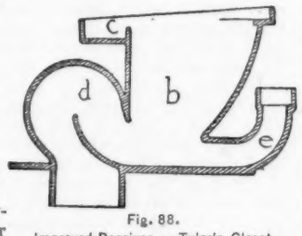


Fig. 88.

Improved Receiver. — Tylor's Closet.

b, Receiver. *c*, Box for overflow. *d*, Trap. *e*, Opening for bath or lavatory waste.

Tylor & Son manufacture several valve-closets which differ from each other only in unimportant details. They invented, in 1878, as an improvement on their old closet, an inlet into the receiver running below the water-line, for a bath-tub or lavatory waste-pipe. We have all probably had experience in the effect produced when a trap like this becomes accidentally stopped in any way, as this was a common mode of connecting the waste-pipes (it saved a trap) a few years ago in this country. A small number of plumbers still continue the bad practice.

In the closet under consideration the valve is very similar in construction to the Hellyer valve, a rubber or leather disc enclosed between an earthenware disc on top and a metal one beneath. The earthenware disc is the smallest, thus enabling the pliable disc to fit against a projecting metal seat. The traps of

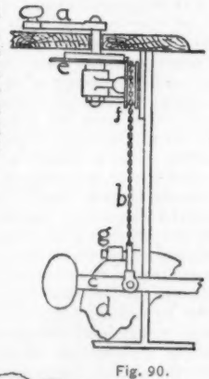


Fig. 90.

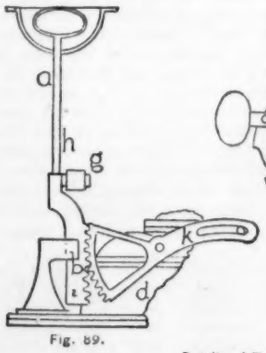


Fig. 89.

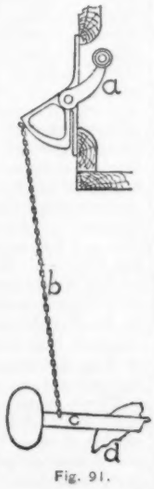


Fig. 91.

Details of Tylor's Valve-Closet.

a, Crank. *b*, Chain. *c*, Lever. *d*, Trap to closet. *e* and *f*, Wheels at right-angles. *g*, Stud for supply-lever. *h*, Hand-pull. *i*, Rack. *k*, Toothed-lever.

these closets have an inspection cover bolted to the trap, with a vent-pipe inserted into the crown; the vent is so very small as to be almost, if not quite, useless. There is no vent-pipe to the receiver. Tylor claims as his invention the three ways of opening the valve illustrated above. The first method was by forming a rack and pinion of the hand-pull and a segmental projection on the lever that opened the valve. The second method was by means of a crank placed in a horizontal position above the seat (see Fig. 90), as shown in the cut. This crank when turned imparts motion to a combination of wheels, on one of which is a drum upon which a small chain is wound (the drum is in a vertical position). In this manner the weighted lever is raised or lowered. The third method consists in simply attaching a chain to the lever and a bell-crank; any pressure on the crank would raise the lever.

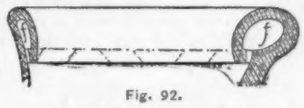


Fig. 92.

Flushing-Rim. — Tylor's Closet.

Doulton Lambeth Valve-Closet. — Doulton & Co., of England, manufacture a valve-closet in which the receiver or valve-compartment and trap are in one piece, and this piece is placed above the floor. This closet appears simple in its mechanism. The manner of trapping the overflow by introducing it into the main trap below the water-line is a novelty with this class of closets, and while it has the advantage of insuring a water-seal for the overflow, it is liable to become foul where it enters the trap. The receiver has an ample vent-pipe,

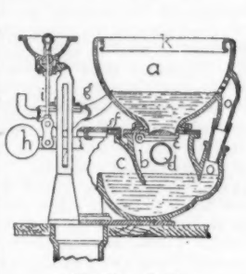


Fig. 93. — Section.

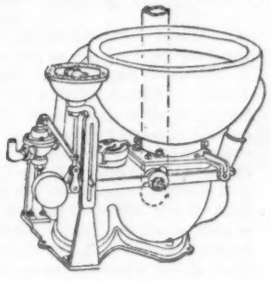


Fig. 94. — Perspective.

Doulton Lambeth Valve-Closet.

a, Bowl. *b*, *c*, Receiver and trap. *d*, Vent-pipe. *g*, Supply-pipe. *f*, Inspection-hole. *h*, Weighted Lever. *i*, Supply-valve. *k*, Flushing-rim. *o*, Overflow.

but the trap is not ventilated from the side where it is connected with the soil-pipe, as it should be. "The trap is provided with an opening for inspection, . . . which is secured with a patent cap ground into the opening, and so constructed that a slight turn one way or the other disengages or fixes it. . . . The valve has an earthenware facing and the interior of the trap is lined with strong, smooth glaze, perfectly impervious and incapable of corrosion," for these reasons offering the least resistance to water or soil passing through it, and at the same time insuring more perfect cleanliness. The trap is furnished so the bowl may be placed in front or on the right or left side, of the soil-pipe. In the perspective, the mode of attaching the Doulton patent supply-valve is shown.

DEDUCTIONS.

If it should be necessary at any time to select a valve-closet, one should be chosen with simple mechanism and few parts. The only closets of this class which appear to be practicable are those with hinged valves, the valve having either a rubber seat or disc, or both seat and disc of rubber. The time the valve will last without fixing depends on the durability of vulcanized rubber. The receiver should always be enamelled, earthenware being still better, as there is a possibility of the enamel being thrown off by corrosion or rust between the enamel and its iron back. The receiver should always be ventilated, as there will always be more or less offensive matter deposited on its sides; for this reason the smaller and smoother the receiver is the better. The vent-pipe in the receiver also keeps the overflow-trap from being siphoned by the water discharged from the bowl. This compartment should also be separately flushed, although I have no idea that a surface, no matter how well glazed or vitrified, over which fæcal matter, urine, and water in which these matters are floating in particles so finely divided as to be invisible, can be kept clean without the application of soap and water on a mop or swab by hand. I consider the variety in which the trap is above the floor, forming atthe same time the receiver, as the best arrangement for part of this the closet, but the advantage gained would not counterbalance lack of ventilation.

I consider the side-outlet valve-closet, in which the valve opens in an outward direction from the bowl, as the best of this class. The back of the valve never coming in contact with the waste matter, the only part of the closet between the bowl and the trap that could become foul and not be noticed would be the short pipe between the valve and the floor; while this would become more or less foul, it would be scoured as thoroughly as a column of water unaided could wash any surface; but a trap must be used below the floor. These closets are far superior to the pan-closets, of which I will give a description in the following pages, in their capacity for retaining a large amount of water in the bowl, and in the receiver being smaller; but they are defective in having a compartment, however small, between the bowl and trap when they have a trap, and the valves are liable to leak when least expected; then the advantage of the body of water in the bowl is lost. The overflow, unless filled by a driblet, will be emptied by

evaporation. It will have been noticed by the foregoing descriptions that the better closets of this class have a flushing-rim, by which the water is supplied to all parts of the bowl at the same time from a cistern. Where these closets have only a fan supplied from a supply-valve, the waste matter is liable to remain in the trap until the bowl has been emptied several times.

REBER'S HISTORY OF ANCIENT ART.[1]

PROFESSOR REBER has the gifts of condensation and presentation. We think of no book that covers the same ground as this which is, on the whole, so well adapted or so likely to be interesting to the general reader and to the student in his earlier progress. The most notable qualities of the book are its continuity and shapeliness, the skill with which the subject is kept in hand, and with which an amount of material that most writers would find it difficult to handle, is wrought into a consecutive whole. To these we must add scholarship, alertness of mind, suggestive thought, and an unusual power of compact and lucid statement, and we have enough to ensure that the book shall be attractive and stimulating, as well as instructive. It is, indeed, an historical essay or sketch, rather than a history. Professor Reber assumes the right of the essayist, and brings into strong relief such parts of his subject as he considers most significant, and passes lightly over intermediate tracts — the only treatment, in truth, by which a subject of so wide a range could be interestingly and serviceably discussed in a volume of this compass.

Greek art is made the central topic, and occupies nearly half the book, being naturally treated with more detail than any other part. Egypt is next to Greece (or rather to Hellas, used, in its broadest sense, to include all the Greek colonies). There is much skill in Prof. Reber's correlation of the branches of his subject, tracing the relation of one country's art to another's, and leading up to Greek from Egyptian, Oriental, Phœnician, and away from it to Etrurian and Roman. The reader may be surprised to find Lycia and Phrygia cast in with Phœnicia, but we think the treatment in the book justifies this. The scanty records of Phœnician and Etrurian art are made the most of; they are given the prominence which is legitimately due more to their intimate connection with the arts of Greece and Rome than to their own importance.

The hundred pages devoted to Greek architecture seem to us to contain the most interesting discussion and the best workmanship. The Doric temple is made its leading theme, as it may naturally be; the study of its development is followed with sufficient detail, with great acuteness and logical sequence, and with a vivacity that makes the account interesting. In the same way the threads of development in Egyptian architecture, and of its relation to Greek, are firmly held and clearly followed. On the other hand a very inadequate treatment, it seems to us, is given to Roman architecture, inferior indeed to Egyptian in force and majesty, to Greek in purity and all the finest artistic qualities, yet superior to both in intellectual power, in variety, scope, fulness of development, and influence on the world. But of this it is enough to say that Prof. Reber's point of view is distinctly Greek, with which we do not quarrel. For a title which should fairly characterize his book we might with fitness have: "An essay on Ancient Art, from a Hellenist's point of view."

The treatment of Greek sculpture and other sculpture is in the nature of things less satisfactory and less interesting, for the central clue is lacking, the lines of development less clear, the sequence more broken, the facts less patient of classification, and the amount of detail enormous. The subject is handled as well as it is easy to handle it in so small compass, and full advantage is taken, down to the date of the work, of late discoveries, *e. g.*, Schliemann's and Di Cesnola's researches, the excavations at Olympia and Pergamon. We may wonder whether Semper's empaistic theory is not pushed a little farther than it will bear, as is apt to happen to new theories; but it is so significant a theory, especially in the light of the discoveries at Mycenæ and Cyprus, that it deserves to be brought into prominence.

Any discussion of antique painting must unavoidably be unsatisfactory, if only for the opposite reason that its remains are so scanty — absolutely nothing, indeed, of the work of artists of importance, so far as is known. But this makes it the more singular that Prof. Reber, in a history of ancient art, should not have said a word, except incidentally, about Greek vases. One might read the volume through and hardly learn that a Greek had ever painted a vase; yet these vase-paintings are the only monumental record of Greek painting that we have, and, comparatively trivial and inferior though they are, while they can tell us nothing of the color, treatment, and quality of Greek pictures, they do give us, inferentially and collaterally, considerable knowledge of these subjects and development.

The book has the defects of its qualities. The author's generalizations are so neat, his way of putting them so clear and persuasive that opposing views have no chance. Even on questions on which controversy is keen, and the opinion of scholars of authority fully equal to Prof. Reber's differ altogether from his, or in matters in which, so far as we know, his opinion is exclusively his own, he is apt to write so that no reader unacquainted with the subject would dream that there was foundation or currency for any other view than his. Inferences and even conjectures which are ingenious and plausible, but not conclusive to an expert, sometimes in the nature of things or in the present state of knowledge not susceptible of determination, are set down as if they were ascertained facts or unquestioned deductions. This may be looked for when an author writes an avowed polemic; it is harmless in a book addressed to the learned; but in one which is intended or adapted for the amateur and the student, it is misleading, and a serious fault which ought to be noticed. It explains naturally enough why one may hear Prof. Reber challenged among his own countrymen as a *dilettante* and theorist. The first name seems misapplied — at least, we wish there were more *dilettanti* as learned and acute,— but the fault remains.

A case in point is the Vitruvian theory of the wooden origin of the Doric order, a theory which is on the whole pretty generally accepted, and will probably come to pass unchallenged. Nevertheless it is disputed both in Germany and France by men (Boetticher, Viollet-le-Duc) on whom Prof. Reber cannot look down. In this book, however, it is not only brought forward as unquestioned, but pushed much farther than by Vitruvius. He says, for instance, that the triglyphs were channelled boards covering the ends of the ceiling-beams. Prof. Reber adds that the mutules were also boards pinned on the under side of the sheathing, in which the rafter-ends were cased, to mark the position of the rafters. Moreover, the triglyphs were made of three narrow chamfered boards, whose edges, juxtaposed, gave the channels, while the tenia was a strip of board pinned to the lower edges of the triglyphs, to hold them together, and reinforced under them by additional strips which formed the regulæ. The so-called guttæ were the ends of the pins or tree-nails used to fasten the mutules, triglyphs and regulæ, and in the translation are accordingly called trunnels. All this is plausible, much of it likely enough; but it is not susceptible of proof, is denied by some scholars, and may be very wide of the truth, yet Prof. Reber asserts it all as if it were unquestioned knowledge. One is tempted to appeal from the author to himself, and quote the much more cautious remark with which, in his book on Architecture in Ancient Times (*Baukunst im Alterthum*) he closes his discussion of the same theory. There he says that he "would not make the Greeks' treatment of the Doric entablature subservient in all its details to their sense of primitive structural significance and relations, without allowing for a good share of caprice (*Willkür*), which always plays its part in ornamentation."

The hypæthral question is a stronger instance. This is one of the most vexed questions of Greek architecture, — has perhaps been more discussed than any other. The weight of opinion, however, has been decided in favor of accepting the simple statements of Vitruvius, that there was an opening by which light was admitted through the roofs of certain temples, and at variance only on the minor question how this was done.

Professor Reber gave a page of his German edition to a very positive assertion of the hypæthral doctrine, saying that "only by accepting the hypæthral temple can we come to a full appreciation of a Parthenon, or of an Olympian temple of Jupiter." Yet in the translation the whole question is suppressed; and the reader, who naturally scans the text to get an opinion on it, finds the hypæthron absolutely ignored. He discovers the assumption of the theory of which Ross has been the strongest supporter—and which Mr. Clarke, our translator, energetically maintains—only when he notices this subordinate clause of a foot-note: "While the existence of a so-called hypæthron . . . . is inadmissible from the point of view both of design and of structure." It will be noticed that nothing is said of the point of view of evidence. This is hardly a proper way to dispose of an important and conspicuous question, on which the balance of learned opinion is distinctly against Ross's theory. The title-page tells us that Mr. Clarke in translating has augmented the book, so that we cannot be sure how much is Prof. Reber and how much Mr. Clarke; but the translation claims to embody a revision by the author and has his approval, so we must assume that it gives his present opinions. If we turn to his *Baukunst im Alterthum* we find him saying "Thus arose the hypæthral temple whose existence, after Boetticher's irrefragable refutation (*unumstosslicher Widerlegung*) of Ross's objections, ought no longer to be questioned." It is phenomenal that a writer who within a short time has turned such a striking somersault should take up his new position with such immovable assurance.

These cases are enough for examples of what seems to us the chief fault of Prof. Reber's book, its air of absolute finality. The reader new to its subject will get abundant facts, admirably selected and coördinated, acute and interesting generalizations, suggestive remarks; but scarcely anywhere in the book will he find a hint that there is more to be learned anywhere, or that an opinion given is susceptible of modification. There is no citation of authorities worth mentioning, no attempt at bibliographical aid to the reader, nothing to show him how to advance a step from where the book leaves him. This is not of so much consequence to the general reader, who will be likely to content himself with a single book, and will probably not find another, at least in English, so good for his

[1] *History of Ancient Art*, by Dr. Franz von Reber, Director of the Bavarian Royal and State Galleries of Paintings, Professor in the University and Polytechnic of Munich. Revised by the author, translated and augmented by Joseph Thacher Clarke, with 310 illustrations and a Glossary of Technical Terms. New York: Harper & Brothers. 8vo., pp. 482.

purpose; but it is a serious matter for the young student, who needs finger-posts to set him on his way forward, and to whom it is an injustice to imprison him in prejudgments of questions which the world has not decided. It is difficult, certainly, in the midst of the enormous literature of to-day, and in a subject of so great range as Prof. Reber's, to make a satisfactory selection of authorities, but the difficulty of the task only makes it more important. The original edition was furnished with bibliographic lists which, if not unexceptionable, are very useful. The German edition is also furnished with a list of its illustrations, credited to their authors. Such an acknowledgment not only gives credit where it belongs, in a book whose illustrations are, with hardly an exception, borrowed, but it is full of very valuable suggestions for the reader. Here, nevertheless, there is no hint of it.

It remains to say a word of the translation. This we find, on turning to the original, to be free, even to paraphrase, and the freedom used seems generally to have been beneficial. We are struck, indeed, with the firm way in which the translator lays his hand on the essential thought of the author, and turns it into language of his own more compact than the original. The book has thus gained considerably in directness, and with the same text would be considerably shortened. Sometimes, indeed, there is loss of clearness, or completeness, by the condensation, as where (p. 16) the translation says: "The Proto-Doric columns originated from the mathematical duplication of the prismatic sides and angles of the square pier." Reber's remark was: "A purely mathematical idea underlay it—the duplication of the faces and angles by chamfering the corners of the square pier." The concision, moreover, is a little apt to change the moderation of the original into a dogmatism which is less agreeable. The matter of the book has been considerably increased in parts. The discussions of Greek architecture, and still more Greek sculpture, appear to have been much modified and enlarged: many new cuts have been added. The additions are germane, interesting, and valuable, and were needed to keep pace with the progress of archæological study since the book was written.

Mr. Clarke's enthusiasm for Greek words and forms is pronounced. Most readers will find something to forgive in terminology and spelling, and will be disturbed by such solecisms as "tore" for torus, "ogive" for pointed arch, "spirals" for volutes, "trunnels" for guttæ, the "kernel" of a capital instead of the bell; such a neologism as a "powerful" pier or cornice for a vigorous one; or such downright slips as "calyx" for corolla, or "cherubims," and "a cherubim." But this matter has a graver aspect than that of mere oddity of language when it comes to the deliberate intrusion, to please an individual whim, of new terms into a technical vocabulary which is already adequate, established, and understood. If every new writer on architecture feels himself at liberty to revise its terminology, the result will be confusion, and enormous increase of difficulty to students and readers. With the translator's fervor for the Greek spelling of classical names familiar in a Latin dress, we do not heartily sympathize: in most cases they leave only a little flavor of oddity; but when we come upon "Phoibos" we do seem to sniff the garlic of pedantry.

We should like to be able to praise the appearance of the volume. Its illustrations are many and graphic, but the reproductions are coarse. The whole embodies the prevailing faults of American book-making—assumption of an elegance that is not there, shiny paper, thick and stiff enough to be disagreeable in the hand, yet not opaque; a page too large for the sheet; excessive leading, which gives a loose-looking letter-press in unpleasant contrast to the narrow margin. The whole looks inferior, and unworthy of a book which, with all due allowance for the shortcomings we have mentioned, we should heartily commend to any reader of its subject as on the whole the best of its kind that we know.

THE LATE AMERICAN ARCHITECT COMPETITION.

REPORT OF THE JURY. — III.

"*GOLDEN GATE'S*" scheme is quite different from that of any other competitor, but his experiment is not a successful one. He has only a ground-floor and attic; this would naturally increase the area to be built over, and the additional cost of foundations and cellar would at once place him at a disadvantage from an economical point of view. As five chambers, a reception-room and "den," beside the dining and sitting rooms are provided, the total cost would figure up considerably above our limit, if the house should be properly built. While the exterior is not wanting in attractive features suitable for a seaside cottage, the interior is singularly unfortunately arranged. A long, narrow corridor six feet wide serves for a hall, and leads directly to the kitchen door, which is thus directly opposite the front door. This is both dreary and inconvenient, and the stairs to the attic ascending between closed walls adds to the discomfort. On the left hand of this corridor open two chambers and a bath-room — the latter had better have been placed so that it could have connected with the kitchen plumbing. On the side of the stairs are the reception, sitting, and dining rooms *en suite*, and "den," opening from the sitting-room. This generous communication is to be commended. There seems to have been no reason for omitting the fireplace in the dining-room, which could have been combined with that of the kitchen. The details are carefully drawn, but show inexperience; the detail of the kitchen porch is peculiarly childish; the hand-rail beside being absurdly heavy is chamfered on the upper side to a sharp ridge which would be most uncomfortable to the hand. The bracket of the mantel is also heavy. The design of the exterior and the perspective are better managed.

"*M*" has chosen — if we knew he lived far from the suburbs of any Eastern city, we should say, has designed — one of the types of economical and convenient plans with which we are already familiar. He has varied it, but not to the advantage of an all-the-year-round house, by making a very large hall: comfortable enough in summer, this would be difficult to heat in winter. There is nothing critical to be said of the convenient and commonplace disposition of the rooms below or above; but the omission of stairs to so prominent an attic as that shown on the elevations is a curious slip. Turning from the plans to the elevations we find again a familiar outline whose simplicity and economy we have already praised. It is not until we come to the details that we realize how wise it was of "*M*" to keep within the lines of recognized examples. It is difficult — and it certainly would be very unpleasant — to conceive of more vulgar details; and this chiefly because they are pretentious and tawdry, and affect an originality which neither the culture of the designer nor means at his disposal warrant. The front door is an inane affectation — costly and ugly. The carved panels show entire ignorance of the first principles of ornamental design, and their introduction is the more obnoxious in that no proper allowance is made in the estimate for the carved work liberally spotted about within and without the building, nor for the equally impertinent stucco panels. This pseudo-ornamental work materially increases the cost of a scheme already passing the limiting cost, and adds not a whit to its beauty. We commend to "*M*" greater modesty in his attempt to use ornamentation and the study of quiet unpretending buildings till he learn the beauty of fitness. Thus his item of $50 for stained glass is entirely out of place in a cottage such as the programme demands. The drawings were on the undesirable tracing-cloth.

"*Midnight Oil*," from the complete absence of all affectation presents a wholesome contrast to the preceding competitor. The plan is excellent, kept well within a rectangular parallelogram; not a foot is wasted. A good-sized vestibule leads to a hall which answers its purpose without waste; into it open dining and living rooms each with a fireplace. It is not evident why the small room opening out of the living-room should be called the "Music room," the most spacious instead of the most diminutive room being usually devoted to that purpose. The kitchen and pantry are well placed. Upstairs good square rooms are obtained and yet ample closet-room provided. Here again the servant's room would better be placed in the attic. The details within and without show studied simplicity, not pinching economy. Special praise must be given to the staircase, which is the most artistic and ingenious one shown in the competition. It is of very cheap construction yet most decorative in effect. As a whole this design is one of the best presented. Its chief defect is the commonplace design of the exterior; this is due partially to its hard, stiff drawing, which is much less prepossessing than the rendering of the staircase. The schedule of prices is one of the most likely to prove a satisfactory guide. There is a business-like air about this competitor's work which must recommend it to practical-minded persons.

"*Comfort*" (*No.* 1) has one of the typical plans mentioned among the earlier criticisms, but what he has gained by an economical plan he has lavishly spent in other ways, so that it is probable that the brick lower story, with the heavy piazza piers of the same material, and the high basement would run up the total beyond our limit. Even according to "*Comfort's*" own estimate, the items, some of which are undervalued, figure up over $3,600. His economy in not providing bath or water-closet is misplaced, and his suggestion that the owner furnish the pump is not fairly meeting a legitimate expense. Seventy-two dollars for the painting is too low, and again $165 for mantels is over-generous. In many ways, however, the design is interesting. The châlet style is just enough suggested to be agreeable. The piazza from the second story is pretty and convenient, and worked with great simplicity. The chief defect in the design is the juxtaposition of two gables of different sizes. The mantel and book-case shown are good, but, as before suggested, beyond the means of the occupant of a cottage which has neither set-tub nor water-closet. The drawings are firm, sharp and reveal a practised hand. The perspective, on tracing-cloth, transgresses one of the rules of the competition. The jury in previous competitions have requested that the device or the *nom de plume* of each competitor be legibly and conspicuously placed upon the sheets, and as far as possible in a similar position on each sheet. Much time is lost sometimes by the jury in searching for the author's device, and it is but fair to warn competitors that such a search, if prolonged, is not conducive to a lenient spirit towards the drawings themselves. "*Comfort*" is printed in the smallest lettering, and then ingeniously hidden in a corner among some scrawling

leaves, instead of being the most conspicuous lettering on the sheet.

"*Argonauts*" shows a curious mingling of shrewdness and inexperience in his planning. His vestibule is built out under the porch in a puerile way and he has spoiled a spacious, airy hall by awkwardly cutting off the corner and has projected his fireplace so clumsily that it injures the room above. Parlor and dining-room open well together, but the chimney in the latter is placed against the outside wall when it might have done double duty if placed against the parlor wall. This same chimney comes out between the two windows of the chamber above, just where the toilet-table should stand. Careful study has been given to the stairs, and they are conveniently arranged. The bath-room is too much shut off from the principal part of the house, and the servant's-room would have found a better place in the attic by utilizing the ample space under the roof — which at present seems wasted. The exterior is injured by the unsightly corner chimney, and the way the roof is managed about it is ugly and impracticable, for a dangerous valley is formed by this superfluous gable. The amount of space covered, the frequent breaks in the plan and the three chimneys, wastefully distributed, make this an expensive scheme. The scanty economy suggested in the architect's commission, which does not cover superintendence, is an unworthy expedient to save money which elsewhere has been unnecessarily wasted. The details show excellent taste and a refined and sober feeling. The drawings lack simplicity and the short-hand, decisive touch which comes only with experience. "*Argonauts*" will do better things in the future, but he must beware of such illogical eccentricities as the cutting off of the corner of his hall. His specifications are in some items carefully made out, but they do not mention the bath-tub, and neither in them nor on the plan is there any indication of a water-closet, nor even of an earth-closet. The $100 allowed for plumbing should have fitted out the house fairly enough in this respect.

"*Benedick*" has boldly sacrificed his hall and reduced it to the merest passage, giving every inch possible to the living rooms. The dining and living rooms form a handsome suite and are well placed; not so, however, the library, whose entrance from the narrow hall is so close to the front door that it suggests a painful economy of space. There is a medium between the large halls belonging properly to spacious summer houses and the niggardly passageway with its straight flight of stairs seen so often in our narrow city houses. "*Benedick's*" error in the latter direction is the more striking since he has treated his exterior in a rustic way which has no hint of a narrow lot of land. The rounded end of the living-room is effective and gives distinction, but such treatment, it must be remembered, is the reverse of economical in construction. Fireplaces in every room are luxuries which our limit of cost will not countenance; but in general this house is simply and economically planned. The interior details are agreeable and well worked out and very skilfully drawn. We must assume that the settee in the hall is temporarily placed there for the benefit of the jury, as a hall which, including its stairs, measures only 6′ 6″, is hardly a resting-place. The drawings, as this proves, are "knowingly" presented.

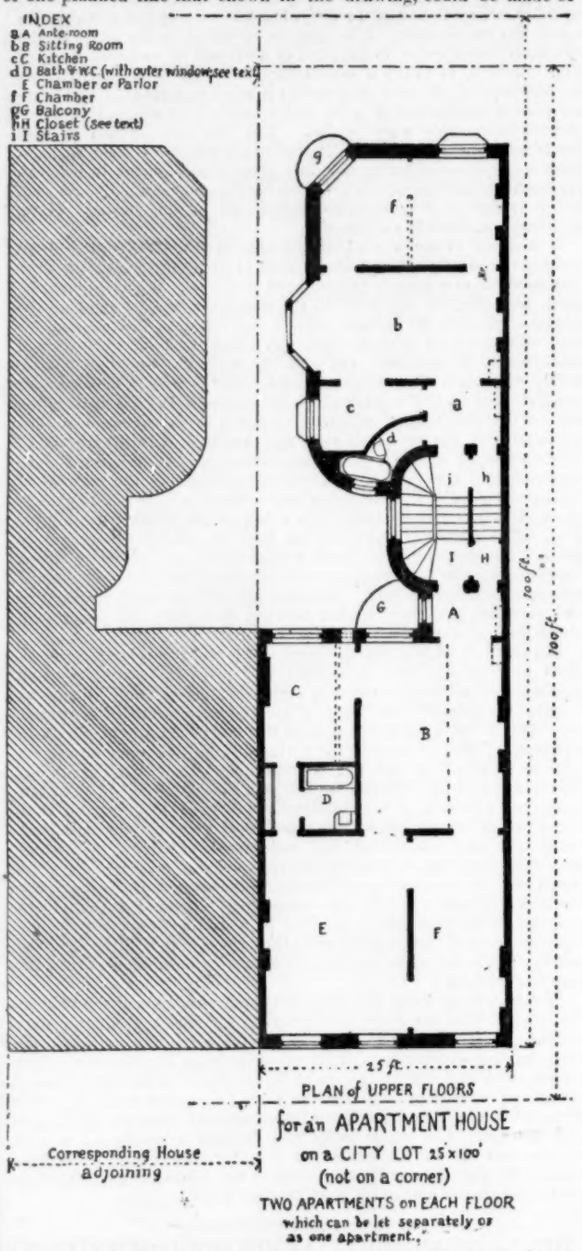
(*To be continued.*)

PLAN FOR AN APARTMENT-HOUSE.

IN the upper part of New York, many flats and apartment-houses are going up which have but little or no light and air in some or many of their rooms; with dark stairs; and from which escape in case of fire would be difficult or impossible.

The neighboring city of Philadelphia is largely composed of houses built also on deep, narrow lots, yet with light and air in abundance in every room, although, often, the number of rooms is greater on each floor. The Philadelphia plan readily lends itself to adaptation as an apartment-house, as for example in the plan herewith, or others, and such a house can readily be made exceptionally safe for escape in case of fire, for the staircase, though well lighted, is in a separate brick chamber.

To save room in the staircase, the rear apartment is on the level of the half-flight or landing of the stairs, but is connected by steps in the closets behind it, which can be used separately with the suites which they adjoin, or can be connected as a passage and the two apartments rented together as one suite of rooms. The bath-room, D, though it has a borrowed light, the upper part of the partition next the kitchen being of glass near the ceiling, yet has a wholly separate window and ventilation by means of a horizontal air-shaft, shown by dotted lines across the kitchen. The window at the end of the air-shaft is hinged, and can be opened and shut from the bath-room by a light wooden bar playing through the air-shaft; one end of it being attached to the window, and the other end projecting as a handle a convenient distance into the bath-room. As shown by other dotted lines, some of the rooms may be further sub-divided, if needed, and each of the rooms so made have their separate window; and this, whether such partitions are permanent or like those folding-door partitions in our old country hotel-parlors, which can be closed or left open, as temporary needs make desirable, either to make bedrooms of one at need, as shown in the rear apartment, or to make a temporary bedroom and passage of the sitting-room, as indicated by the dotted line across it. Such a building may either stand a few feet back from the street line, like most New York houses, or on the line; as further indicated by dotted lines. By a slight change in the planning of the stair-case the front and rear apartments can be planned to be built on a level. Such a stair-case, or one planned like that shown in the drawing, could be made of


INDEX
a A Ante-room
b B Sitting Room
c C Kitchen
d D Bath & W.C. (with outer window, see text)
e E Chamber or Parlor
f F Chamber
g G Balcony
h H Closet (see text)
i I Stairs
25 ft.
100 ft.
PLAN of UPPER FLOORS
for an APARTMENT HOUSE
on a CITY LOT 25 x 100'
(not on a corner)
Corresponding House adjoining
TWO APARTMENTS on EACH FLOOR
which can be let separately or as one apartment.

iron, or with iron strings and stone treads, with more chance of being of use in case of fire than stairs built in the same way, but not enclosed by themselves, and so not shut off from fire in the rest of the house.

THE ILLUSTRATIONS.

COMPETITIVE DESIGN FOR AN OFFICE-BUILDING ON BATTERY PLACE, NEW YORK, FACING THE PARK AND BAY, FOR CYRUS FIELD, ESQ. MR. CHARLES B. ATWOOD, ARCHITECT, NEW YORK, N. Y.

THE principal object in the planning of this building was to provide light and convenient quarters for the compositors on a daily paper which was to be published in the structure, with the presses located in the vaults under the sidewalk. A reference to the ninth-floor plan and the tranverse section will show the quarters provided for the compositors, and illustrate how, by means of wide terraces on the three sides of the building, and an almost unbroken expanse of window surface, except where light piers were needed to support the roof, ample and cheerful space was secured for the workmen. Naturally at this height the view of the Bay and distance would be magnificent, and the *ensemble* of terraces, gables, and pitched roofs, was planned with reference to the effect of the "sky line" when the building was viewed from the bay. Having a frontage on Battery Park, the mass of the structure would always be one

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Design for Office Building

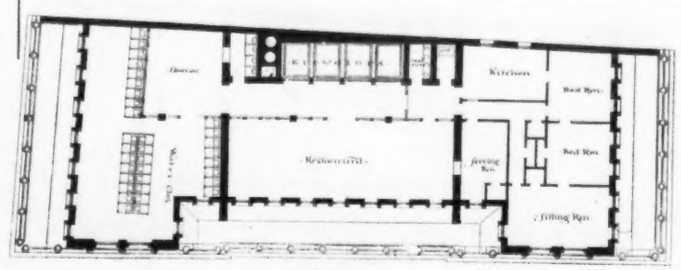
by Chas B. Atwood, Arch't

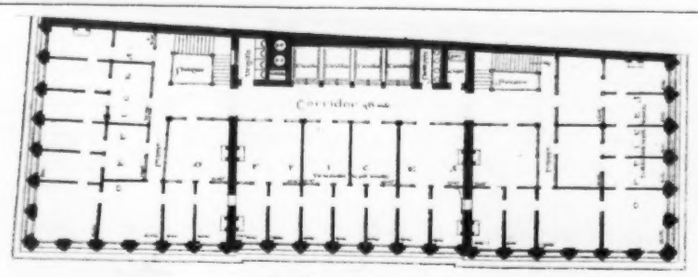
New York

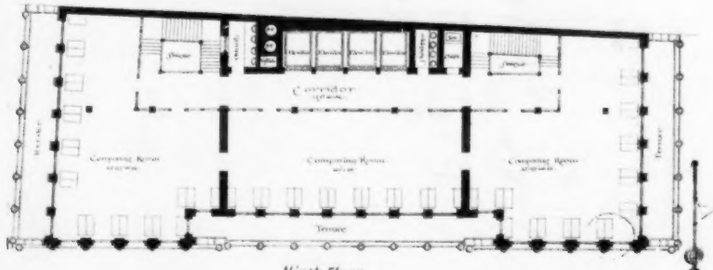
Granite

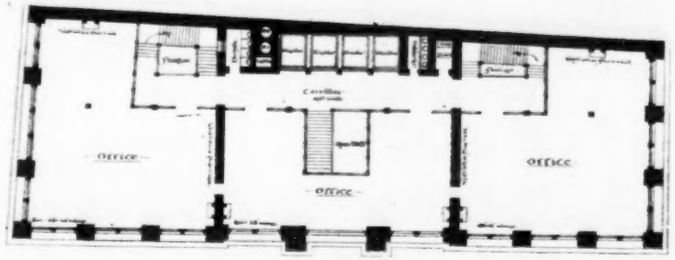
Milwaukee Brick & Terra Cotta

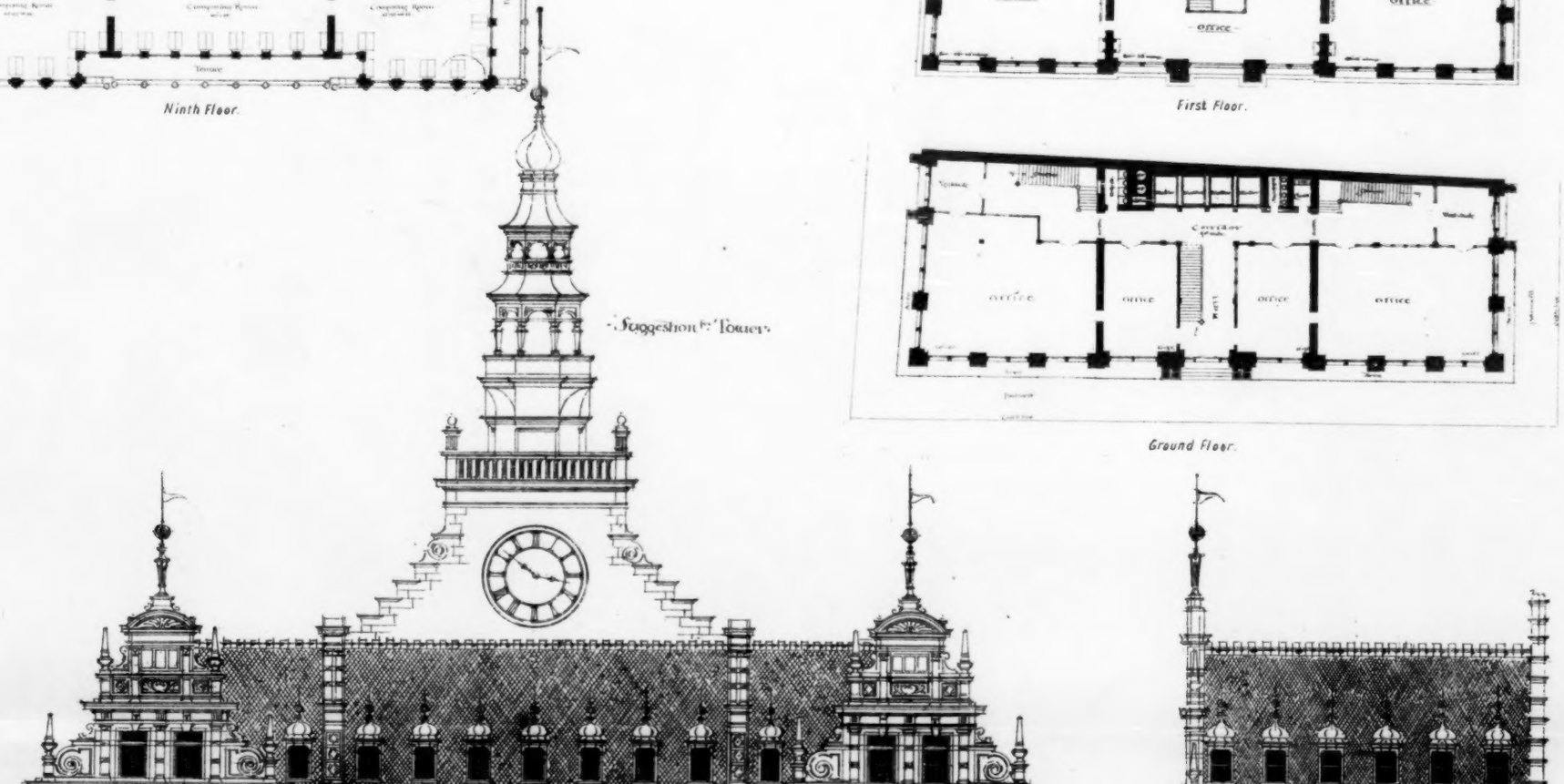
Heliotype Printing Co. 211 Tremont St. Boston











THE BUILDER AND BUILDING NEWS, APR. 21, 1883.

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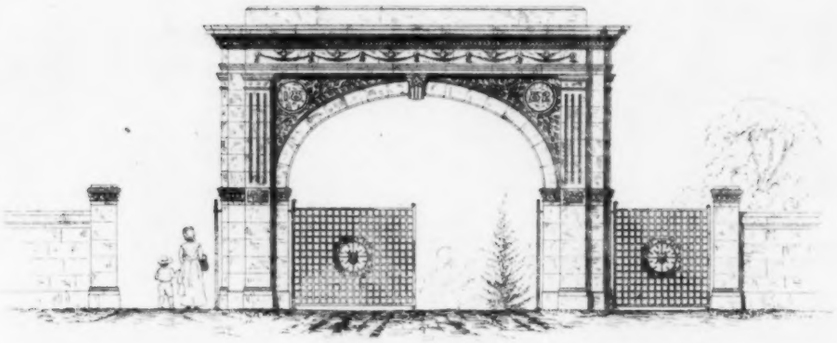
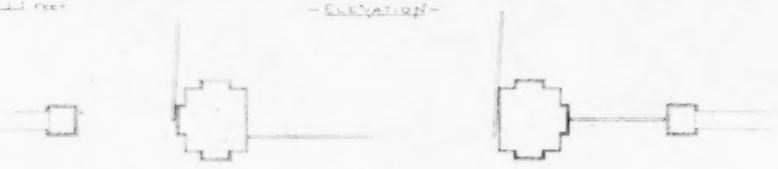
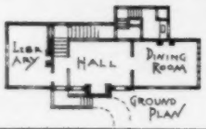
DESIGN FOR A PARK GATE-WAY
BY
H. A. HOWE JR. NEW HAVEN, CONN.



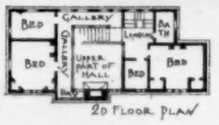
ELEVATION



PLAN



House in Everett Pl. Newport, R.I.
for J. Griffiths Masten Esq.
Alex. F. Oakey & Co. Architects, 4 W. 14th. St. N.Y.



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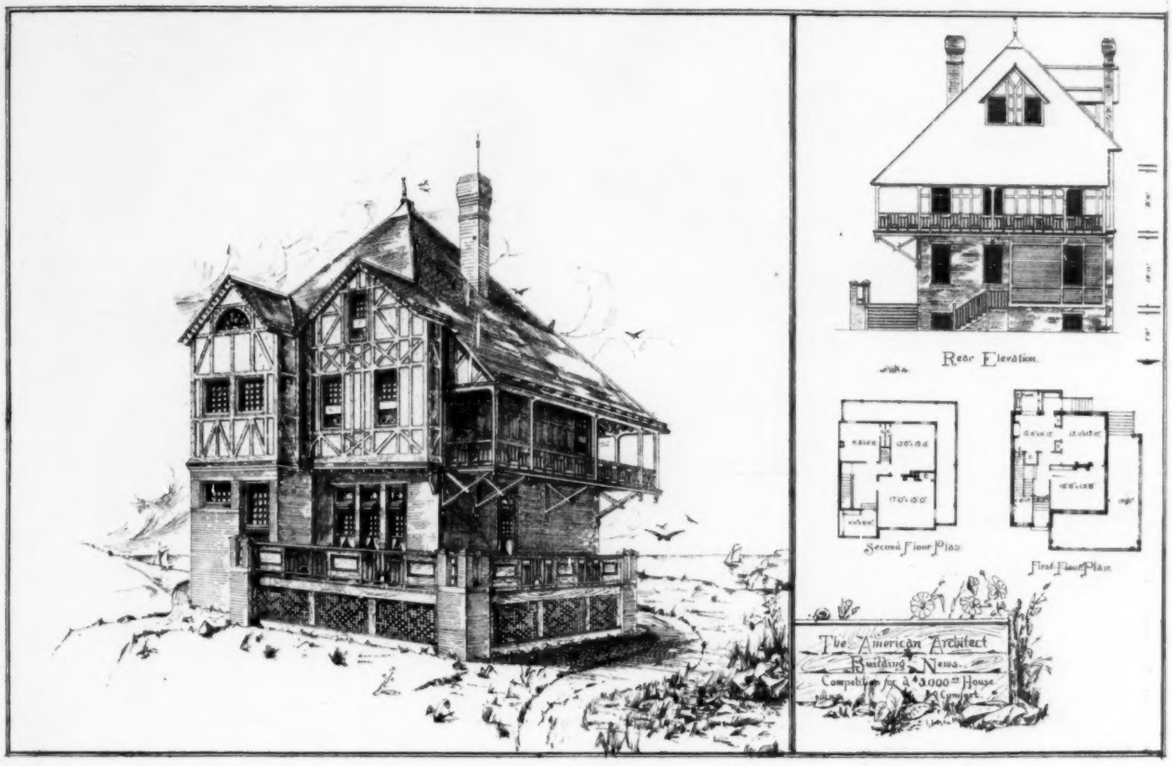
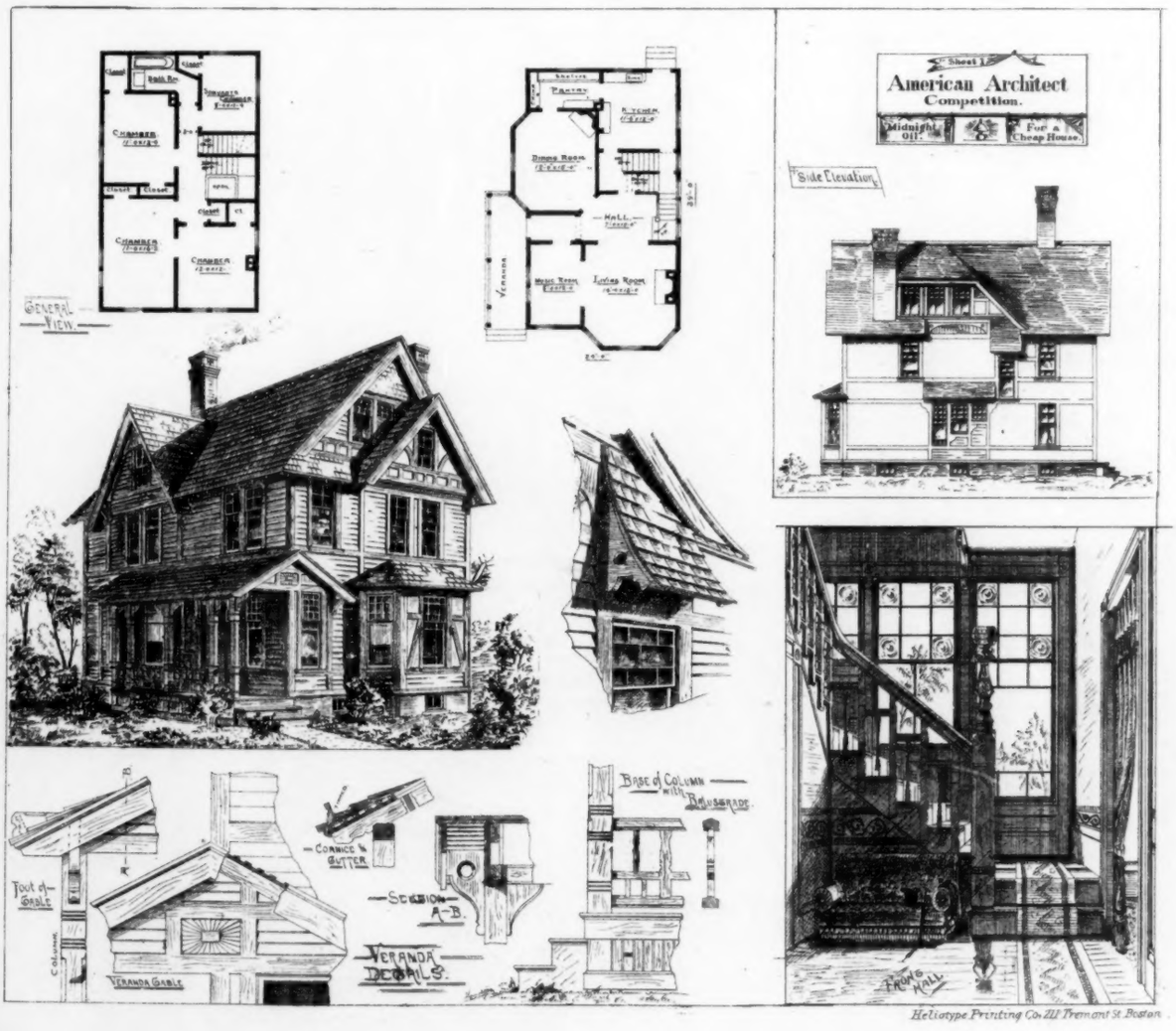




Heliotype Printing Co. 211 Tremont St. Boston.

of the most conspicuous objects to those who had their first view of it from the harbor. The construction of the building was so arranged that the partitions for offices could be changed about to suit the wants of tenants. On the tenth floor was located the restaurant, janitor's quarters, and the water-closets, with urinals on every floor. The elevator-shafts and the large brick flues for boilers, standpipes, etc., were so combined with two heavy tranverse brick walls as to strengthen the building laterally, it being very shallow for its great height.

PARK GATE, DESIGNED BY MR. H. A. HOWE, JR., NEW HAVEN, CONN.

HOUSE ON EVERETT PLACE, NEWPORT, R. I. MR. A. F. OAKEY, ARCHITECT, NEW YORK, N. Y.

MATERIALS, red brick, timber, shingles (redwood); all external wood-work oiled and coach-varnished; red roof; terra-cotta cresting.

COMPETITIVE DESIGNS FOR A $3,000-HOUSE, SUBMITTED BY "*Midnight-Oil*" AND "*Comfort*." (No. 1.)

SHOULD any of our non-professional readers desire to build according to either of these designs, we trust he will do the author the simple justice of putting the work into his hands. We shall always be pleased to put client and author into communication with each other.

THE NEW ARCHITECTURAL MUSEUM.

ACTION OF THE NEW YORK CHAPTER, AMERICAN INSTITUTE OF ARCHITECTS, IN RELATION TO THE LATE LEVI H. WILLARD'S BEQUEST TO FOUND AN ARCHITECTURAL MUSEUM IN THE CITY OF NEW YORK.

AT a regular meeting of the New York Chapter of the American Institute of Architects, held April 11, 1883, the Secretary read the will dated July 25, 1881, and codicil thereto, dated November 25, 1881, of the late Levi Hale Willard, Esq., bequeathing the bulk of his fortune to the Metropolitan Museum of Art (or in case of its refusal to accept, then to Columbia College), for the purpose of founding a museum of models, casts, photographs, engravings and other objects illustrative of the art and science of architecture, the collection to be made under the direction of a commission to be chosen by the N. Y. Chapter of the American Institute of Architects, one member of which it directs shall be Mr. Napoleon Le Brun, architect, of New York City. The members of this commission shall be the sole judges of the extent of the collection and the amount to be expended thereon, and if the bequest should, in their judgment, amount to a sum larger than will be required to fully carry out its provisions, then the remainder of the bequest, if any, may be employed in the purchase of landscape and *genre* pictures of the modern French school. Messrs. Alexander Holland of New York and Robert A. McKinney of Brooklyn, are the executors of the will.

The Secretary also read a posthumous letter (of even date with the codicil) from Mr. Willard to Mr. Le Brun stating his desire that to his son Pierre should be assigned the duty of making the collection under the direction of the Commission.

The following preambles and resolutions, offered by the Secretary, were then adopted:

Whereas, Mr. Napoleon Le Brun, Practising Member of this Chapter and Fellow of the Institute, has, by his able setting forth, seconded by his son Mr. Pierre L. Le Brun, of the claims of the Art of Architecture, been the direct means of securing to this Chapter the disposal of a large fund bequeathed by the late Levi Hale Willard, Esq., to found a museum of architecture, and

Whereas, prompt and hearty recognition is due to the origin of an event which, as the *American Architect* says, "seems likely to mark an era in the history of architecture in this country," as it certainly does in the history of the Institute and of its New York Chapter, therefore

Resolved, that the warmest thanks of this Chapter are eminently due to the Messrs. Le Brun, father and son, and are hereby tendered to them, and

Resolved, that an engrossed copy of these preambles and resolutions, signed by the President and Secretary of the Chapter, be presented to the Messrs. Le Brun.

Messrs. A. J. Bloor and Emlen T. Littell were then appointed the colleagues of Mr. Napoleon Le Brun on the Commission designated by Mr. Willard's will.

THE $3,000-HOUSE COMPETITION. — IX.

DIGEST of the specifications accompanying the design marked "*Midnight Oil*," with the figure of a lamp, thus:

Excavate so as to finish the cellar 7′ in the clear.

Underpinning to show 2′ above the grade-line, faced with split ashlar in irregular courses. Backing of 8″ brickwork all laid in cement-mortar.

Foundation walls of sound, hard ledgestone, 16″ thick, laid up dry, tied with frequent headers. The six inches of wall next below grade to be laid in cement-mortar.

Chimneys: — Foundations to be large flat stone laid so the brickwork will start at bottom of the cement-floor. Chimneys of good hard-burned, well-shaped brick. Fireplaces in the three rooms below as shown, arched over.

Rubbed bluestone shelf in the Kitchen and hearths of same for all fireplaces, turning arches. Breast in Kitchen, also jambs, to be faced with pressed-brick. Those in Living and Dining rooms to be faced inside of the mantels with buff pressed-brick, moulded, at the floor and spring of arch, pargetted. Tops of pressed-brick, forming panels with New Haven moulded brick. Iron funnels and stoppers for all rooms, two in cellar. Lead flashings built in to make tight work.

Slate hearths for Living and Dining rooms.

Outside Cellar Steps: — With bluestone treads and coping, brick risers and jambs, all laid in cement.

Bed-stone placed 3′ below grade-line to receive the wood posts supporting the Veranda and Stoop, also for five posts in the cellar.

Ten bluestone sills for cellar windows.

Cement floor of cellar with 2″ of cement and coarse gravel.

Drains of 4″ vitrified drain-pipe. Have running trap with clean outlet. All inlets made with double-Y sections, to enter foundation walls where most convenient to receive wastes from wash-trays, water-closet, and sink; all joints made tight and the whole line to be well bedded. Roof-water also to empty into drain.

Lathing and Plastering: — All the walls and ceilings in the first and second stories to be lathed and plastered; clear sound spruce laths. Brown coat well-floated walls of Kitchen, Pantry, Bath-room and back stairway to be trowelled smooth for painting; all ceilings excepting closets to have a good hard clean coat of hard-finish, ceilings brush-polished, walls made smooth for papering.

Nothing is to be finished in the attic.

Grading: — Properly grade around the house.

A 3′ 6″ walk of packed gravel 12″ thick, from street line to front entrance and around the house.

Carpenters Work: — Frame to be of balloon construction, of sound seasoned spruce: *Sills*, 4″ x 6″; *Posts*, 4″ x 6″; *Plates*, of two 2″ x 4″, spiked together with lapped joints; *Studs*, 2″ x 4″, 16″ from centres, those at windows and door-jambs to be 3″ x 4″; all angles of partitions made solid; *Floor* joists 2″ x 8″, 16″ from centres, those for the attic floor to be 2″ x 7″, 22″ from centres, *Rafters*, 2″ x 7″, 22″ from centres; have ridge-pole 1¼″ thick, collar-pieces of same, all floor joists to be bridged.

Floor joists double for trimmers and headers, also under all partitions running with them and having no other support, all thoroughly nailed to sills, plate and to every stud they touch. Partition-heads of 2″ x 4″; upper studs must rest on these and not on floor boards, where possible.

Well brace and stiffen the work over bay-windows or other large openings.

To divide the bearing of the first floor-joists, five 8″ x 8″ chestnut posts will be set in the cellar, footing on stone.

Veranda floor framed with 5″ x 5″ sills and 2″ x 6″ joists. Post of chestnut set in the ground on stone, lower end to be charred or tarred. Rafters of pine, 2″ x 5″, planed, ends cut as shown on the details; plate, 4″ x 4″, cased and chamfered; columns built of 1½″ stock, chamfered, beaded neck and base; floor of 1½″ spruce, square edged, planed one side. Rafters to be covered with ⅜″ matched and beaded spruce, in 4″ widths, second quality; on this place ⅜″ x 2″ spruce strips, 2″ apart.

All outside and inside finish where not otherwise specified to be of white-pine, second clears.

All roofs to be shingled with xxx 18″ pine shingles, laid with three laps.

Gutters as shown.

Sides to be brace-boarded with milled inch hemlock, clapboarded with second clears, laid 4″ to 4½″ to the weather; all outside finish to be 1⅛″ thick.

Heavy tarred sheathing-paper under clapboards.

Single floors throughout of ⅞″ spruce, in narrow widths, matched.

Window frames made of sizes indicated, 1⅛″ pulley styles, 1¾″ sills, all for weights, braided cord and axle pulleys.

Sash 1½″ thick, lipped, best American glass; stained glass in upper panel of the front door, stained bulls-eyes set in the Hall sash. Sash all fastened with a good sash-fast. Hinged top light over the back door.

Cellar sash 1¼″ thick, hinged and hooked, filled with good fair glass. Frames for these of pine, 2″ x 4″.

All glass to be single thick.

Doors: — First-story doors to be 1¾″ thick, 2′ 10″ x 7′ 6″. Second-story doors to be second quality, 1½″ thick, 2′ 8″ x 7′, four panelled. Closet doors, 1¼″ thick, 2″ 4″ wide. Outside doors, 1¾″ thick.

Mortice-latch (knob) for all the closet doors. All other doors will have good mortice-locks, white porcelain knobs throughout, outside front door to have night-latch and brass bolt, back door to have iron bolt, brass face and striker for all main doors in the first story. Rubber-cushioned door-stop for all doors.

Architraves for the principal rooms (three) and hall below to be as shown by details; all others to be put on before plastering. Hard-wood thresholds.

Closets: — Shelve the Pantry; six drawers and one cupboard under. Glass casement at one end for china and glassware. Hanging-strips and hooks in all chamber closets; finish a closet leading from the Kitchen under the back stairs. Case with pine one water-closet having double lids; make and set

up a set of three wash-trays in the Laundry. Case up the sink with cupboard under.

Stairs: — 1¼″ treads and ¾″ risers of pine for the front flight, the same of spruce for the back and attic flights. Rough plank stringers and 1¼″ treads no risers) for the cellar flight.

Rail, balusters and newel to be of cherry; balusters and cross-pieces to be cut with square ends and dowelled into place.

Cherry mantels for the Living and Dining Rooms.

Outside Blinds for all windows, in two folds of two panels each, swiveled slats 1¼″ thick, strongly hung and fastened at sill and clapboard.

Wainscot the kitchen 3′ high.

Painting and Papering: — All inside and outside wood and metal work to receive two thorough coats of linseed-oil and white-lead, using two colors outside and one inside. Grain and varnish the Kitchen, Pantry, Bath-room and back stairway. The walls of the Kitchen, Pantry and back stairway to be sized and painted one good coat. Floors of Veranda painted; Prince's Metallic Paint for all metal work. Hard-wood of front stairs and the mantels to be filled, rubbed down and varnished; mantels finished with oil.

Paper all the walls not painted with paper averaging 25 cts. per single roll. Base and ceiling borders for the three main rooms and hall, first story, others to have ceiling-borders only.

No grates nor fireplace furnishings of any kind.

Plumbing and Tinning:—Furnish and set one 18″ x 35″ iron sink, with strainer; one Demarest water-closet, with lead safe and leaded slop-pan; no tub or basin to be used; 2″ waste of iron for all fixtures, including the tubs in the Laundry; brass couplings at joints; traps well ventilated for each waste; 4″ iron soil and 4″ lead trap for water-closet, vented to roof; joints calked and leaded; supplies of ¾″ A lead pipe for the main, ½″ branches; cut-off at wall in the cellar; brass bibbs for sink and tubs, also one near water-closet for chamber supply; tubs to have plugs and chains; cold-water pipes only. Well tin the gutters with XX M. F. tin; four 3″ tin conductors from the main roof and one 1¼″ leader from the veranda roof, the former to all enter the drain.

ESTIMATE OF QUANTITIES AND PRICES RULING AT BRIDGEPORT, CONN.

158 cu. yds. excavation,		$ 35.00
38½ perch stone, foundation		113.00
170 sq. ft. underpinning stone,		40.00
7500 brick, body,		112.50
1320 " face, Crotons,		36.96
200 " buff,		15.50
28 ft. 6″ pipe, for drains, laid,		7.50
108 " 4″ " " " with Y's,		34.75
100 sq. yds. cement floor,		28.50
867 " plastering, brown,		216.75
188 " hard finish,		18.80
Grading and seeding,		10.50
2 slate hearths @ $6,00, and bluestone,		24.50
10772 ft. b. m. spruce lumber, worked,		257.00
2470 " hemlock siding, put on,		67.00
1100 " spruce roof-strips and furrs,		22.50
100 " " veranda ceiling, put on,		3.75
250 " " frieze and rafter feet,		38.00
510 " base, corners and bands,		24.50
250 ft. cornice,		18.50
90 " gutter moulding,		4.50
2880 ft. b. m. spruce flooring, laid,		80.50
1850 4′ clapboards and labor,		115.75
12800 shingles and labor,		99.50
23 doors; frames, hardware and labor, complete,		238.50
36 windows & blinds; frames, h'dw'e & labor, complete,		375.55
10 " cellar,		20.00
Stairs,		95.00
2 mantels, @ $25.00,		50.03
Outside labor and stock,		225.00
Inside " " for pantry and other fixtures,		125.00
Painting,		98.75
150 rolls paper,		37.50
Paper-hanging,		20.00
Border,		6.25
Plumbing, tinning and gas-piping,		155.00
Architect's fee,		142.66 $2,995.97

DESIGN SUBMITTED BY "COMFORT." (NO. I.)

Excavation: — Excavate for a cellar under building, and a cistern of dimensions shown. Dig trenches for walls and piers 12″ below cellar floor. Privy well, and drain trenches, to be dug where directed.

Foundations: — The foundations and piers will be laid with good, hard, well-burned brick, laid up to grade line in good cement-mortar. The cistern to be lined and paved with brick laid in cement-mortar, to be made thoroughly water-tight. Brick in privy well to be laid up dry, the rest of the brickwork to be of selected hard-burned brick, laid in good lime-mortar with neat joints. Chimney to be topped out with selects, and the flues to be thoroughly pargetted. Arches to be turned where indicated, to receive soapstone hearths.

Lumber and Carpenter Work:— All the framing to be of sound hemlock. First-floor joist, 3″ x 10″; second-floor joist, 2″ x 10″; posts, 4″ x 6″; sill and plates, 3″ x 4″. Spacing of studding and joists to be 16″, o. c. Sheathing of hemlock boards over the whole roof and pantry in rear of Kitchen. Sheathing on pantry will be covered with clear white-pine, weather-boards to show not more than 4½″ to the weather. Roof to be covered with good cypress shingle.

Flooring to be of yellow-pine 1″ thick, veranda floor being laid with narrow boards with white-lead in the joints. Joists to be bridged in the middle of bearings over 10′ with lattice bridging. The flues and other openings to be framed with double trimmers where there is more than one tail-joist. The inside partition to be of 2″ x 3″, studding space 16″, on centres, and stiffened with one row of horizontal bridging. Outside studding, 3″ x 4″, 16″ on centres. Window-frames to be made for double-hung sashes, 1⅜″ thick, all of clear white-pine with loose-axle pulleys, cord and weights. Inside rolling-slat shutters to all windows, those extending to floor to be 1½″ thick, others 1¼″ thick. Outside finish to be of white-pine.

Inside finish to be of spruce as follows: first-story architraves, 1″ x 4″, moulded; washboard, 6″ x 1¼″, moulded. Second-story architraves, 1″ x 4″, plain; washboard, 6″ x ¾″, plain. Attic not to be finished.

Doors: — Outside doors to be 1¾″ thick, panelled and moulded; all other doors, 1⅜″, thick panelled and moulded. All of well-seasoned pine.

Wainscot: — Kitchen, Pantry, Hall, and Linen-room, to be wainscoted and capped to height of 3½′ with narrow, matched and beaded yellow-pine. A press to be fitted up in Linen-room with drawers and shelves. Pantry to have shelves, drawers, and lockers. All closets to have shelves and pin-rails. Stops to be fixed for all doors.

Stairs:— Carriages of stairs to be 3″ x 12″, hemlock. To have ¾″ risers, 1¼″ treads and rails, balusters, etc., all of yellow-pine as per details. Privy to be built over well where directed.

Mantels: — Mantel and book-shelves in Parlor as per details. Mantel in Dining-room to be of spruce, not to exceed in cost $40. Neat shelves to be fitted up in all the bedrooms.

Hardware: — The hardware to be of the best American manufacture. Front door to have 5″ mortice-lock, with bronze knob and furniture, night-latch, etc., and bronze bell-pull to bell in Kitchen connected with copper wire. All other doors to have 4″ mortice-locks and porcelain furniture. Closet doors to have closet locks and keys. Back doors to have 8″ bolts. First-story windows to have spring sash-locks. Dresser doors to have spring catches. Shutters to have flat bolts, and hung on cast-iron hinges. All doors to be hung on cast-iron loose butts, except front door, which will be bronzed. Closets to have a suitable number of japanned pins.

Plastering:—Plastering to be good three-coat work, on sound lath, and left hard, white, and perfect on the completion of the building. Outside of building from second-floor joist, to be covered with plaster composed of two parts clean sand and one part Portland cement, on good sound laths as per details. The whole to be pebble-dashed.

Roofing:—The roofs are to be sheathed with 1″ hemlock boards and covered with cypress shingles, laid on one thickness of roofing-felt and painted one heavy coat before laying. Valleys, gutters and flashings to be of best quality I. C. charcoal tin, painted on both sides and finished with an additional coat on top. Conductors to be 3″ diameter, with turn-outs at base. Galvanized-iron finial and saddles.

Painting and Glazing:—All exterior and interior wood-work to receive three coats best white-lead and linseed-oil paint, and to be finished in such tints as may be directed. The shingles to be painted with one heavy coat before putting on, and two additional coats of such tint as may be selected.

Glazing to be of best American glass left perfect on completion of building.

Plumbing and Gas-fitting:— Drive a 1½″ pipe to the depth required to obtain a free flow of water, connect with pump in Pantry. Pump to be furnished by owner. Also furnish and set up a 2′ x 3′ slop-sink in the same room, with necessary connections to the drains. Furnish and lay all the 4″ cast-iron and terra-cotta drain-pipes shown on plan. Run the required gas-pipe as shown on plans.

Heaters:—Two Latrobe or Baltimore heaters to be placed in Parlor and Dining-room, with hot-air pipes leading to second floor, and the cooking apparatus to be furnished by the owner.

ESTIMATE OF QUANTITIES AND PRICES RULING NEAR BROOKLYN, N. Y.

150 cu. yds. excavation,	@ $ .25	per yd.,	$ 37.50	
62000 bricks,	" 12.00	" M.,	744.00	
6781 ft. b. m. framing,	" .01½	" ft.,	101.71	
1000 " sheathing,	" .01½	" "	15.00	
40 sqs. flooring,	" 4.50	" sq.,	180.00	
Window-frames,			50.00	
Door-frames,			50.00	
Sash,			60.00	
Doors,			72.00	
800 ft. architraves, etc.,	@ $ .08	per ft.,	64.00	
960 ft. baseboard,	" .06	"	57.60	
Blinds,			78.40	
Outside finish,			220.00	
Wainscot,			25.00	
324 ft. weather-boarding,	@ $ .05	per ft.,	16.20	
Presses, etc.,			65.00	
Stairway, etc.,			110.00	
Privy,			12.00	
Mantels,			165.00	
Hardware,			20.00	
160 yds. outside,	@ $ .60	per yd.,	96.00	
315 " inside,	" .30	" "	94.80	
10 sq. shingles,	" 7.00	" sq.,	70.00	
87 yds. painting,	" .30	" yd.,	22.40	
Glazing,			150.00	
Plumbing and gas-fitting,			80.00	
Labor.			300.00	$2,905.31
Builder's profit,	@ 20 per cent,		581.06	
Architect's fee on estimated cost,			150.00	731.06
				$3,636.37

WARING'S SYSTEM OF SEWERAGE IN PARIS.

THE order recently given by the municipality of Paris for the sewerage of a large experimental district of that city on plans prepared by Geo. E. Waring, Jr., on the Memphis system, — an order for the sewerage of about four kilometres of streets and of about one hundred large apartment-houses, — was determined by the following address, delivered by Mr. Ernest Poutzen, C. E. (*ancien élève de l'Ecole des Ponts et Chaussées*), before the *Commission technique de l'assainissement de Paris.* Mr. Poutzen said: —

When I had the honor, on the 18th of last November, to be present at your meeting, I had not been fully advised as to what I was expected to say in exposition of Waring's System.

The report of the proceedings of that meeting show that I was not clear in my exposition, and in availing myself of the opportunity that you now give me to discuss again before you the question of sanitary improvement according to this system, I beg you to excuse my past incompleteness, and to give me your kind attention.

Mr. Waring has undertaken to solve the problem of removing, with the greatest possible promptness and with the least possible expense, from habitations and from towns all of their foul wastes. This problem cannot be solved by the periodical removal of fæcal matters, and it can be done only under certain circumstances by the establishment of sewers of sufficient diameter to secure the removal of household wastes and of storm-water together.

The *periodical* removal of fæcal deposits gives these azotized matters time to enter into putrefaction, and to infect habitations. The re

moval thus often creates a great nuisance, and, as with several of the systems adopted for periodical removal, it involves very considerable outlay. Householders have a direct interest in reducing to the utmost the consumption of water within the house, which is another source of unhealthful conditions. Large sewers connected with the houses by branches cannot accomplish the end of the immediate removal of fæcal matters, unless we adopt the principle of discharging everything into the sewer. In this case fæcal matters are removed immediately from houses and the transportation beyond the limits of the city by the stream flowing in the sewer; *but only in case that the fall of the sewer is sufficient to maintain a constant given velocity, and in case that there is always a sufficient amount of flow.*

This condition is much the more difficult to secure for the reason that these sewers, calculated to carry storm-water, must have a diameter much greater than that required for the needs of foul-sewage removal. Therefore, in time of drought and especially with sewers of slight fall, the depth of the stream carrying the waste matters being slight, their removal is but slow and incomplete. Hence the hesitation to adopt the principle of discharging everything into the sewers, which, however, offers no difficulty and no danger; that is, it need give rise to no bad odor and to no dangerous emanation, if only the removal of these matters can be made rapid and complete.

Mr. Waring, in order to ensure the rapid and complete removal of fæcal matter and of all household wastes which, like the contents of privy-vaults, enter into fermentation and putrefaction if retained, diminishes to the minimum the capacity of discharge in the sewers, and excludes absolutely all rain-water. By such exclusion he secures a sufficient reduction of diameter where, otherwise, sewers of great capacity would have been necessary. It is not only nor chiefly because of the economy of construction thereby secured that Mr. Waring excludes rain-water; it is, above all, in order to avoid deposits which must result from the variable quantities (*régime irrégulier*) caused by the admission of rain-water, that he insists on this absolute exclusion. These deposits are especially to be feared in sewers of slight fall, while in the pipes which Mr. Waring employs, and in which fæcal matters are always diluted in about the same quantity of water, this danger does not exist even with reduced inclinations. In order to make perfectly certain that all deposits which might nevertheless be formed in the pipe-sewers shall not remain there long enough to enter into decomposition, he establishes at the head of each branch of the sewer an automatic flush-tank, and if the branches are long and of slight fall, he even employs more than one, or one of more than the usual size.

These flush-tanks are cisterns placed in the ground, fed from the water-supply, and so arranged that when the level of the water that they contain reaches a certain height, they empty themselves spontaneously and rapidly by means of a siphon which is brought into action when it begins to overflow. After having examined the different forms of automatic flush-tank available for such use, he has adopted that of Mr. Rogers Field.

It is hardly necessary to say that the sizes of the pipes constituting the sewer increase with the increase of duty that it has to perform. The smallest of the street sewers have a diameter of 15 centimetres. These small diameters render it necessary to prevent the introduction of all large objects which might cause obstruction. The means employed therefor are simply a reduction of the size of all house-drains to a diameter of 0.10m. These house-drains and vertical soil-pipes are flushed (*rincés*) both by the discharge of water-closets and by the discharge of the ordinary waste waters of the household.

The usual size of the sewers as they increase beyond the diameter of 0.15m. is such that at the time of greatest use they will flow to about one-half their capacity. It is found that the variation of the flow is hardly more than twenty per cent, except as increased by the discharge of the flush-tanks, which occurs with greater or less frequency according to the rapidity with which water is admitted to them. It is generally so arranged that there shall be two discharges during the twenty-four hours. These discharges carry forward all matters which may have been deposited, and they effect a washing of all that part of the pipe which is alternately covered and exposed by the variation of the current of the sewer.

If the air in the sewers were always stagnant, it might, notwithstanding the rapid removal of fæcal matters, constitute a centre of infection and of dangerous germination. By a constant removal of the atmosphere of the sewers, these dangers are avoided. The air which moves above a current of water containing *fresh* fæcal matter carries with it neither odor nor dangerous germs. Mr. Waring, in order to ensure this constant renewal of the air in the sewers, carries all of the soil-pipes above the tops of the houses, with open mouths, and he furnishes air-inlets at each junction of two sewers. These air-inlets are covered in such a manner as to prevent the introduction of rain and storm-water, and they are so arranged as to allow of the inspection of the condition of the sewers. The draught of each soil-pipe adds to the movement of air entering at these inlets. It would generally be best to establish a water-seal trap at each closet and other connection with the vertical soil-pipe; but even if these did not exist, the annoyance of open closets is avoided by the soil-pipes opening above the tops of the houses.

In reviewing what has been said of Waring's system, it is seen that it is a system of "Everything to the Sewer," with the exclusion of storm-waters, carried out in a very economical manner, replacing large sewers by earthenware pipes of small diameter receiving all the dejections and all household wastes. The sewers thus established are provided at the heads of all the branches with automatic flush-tanks, of which the capacity varies according to the inclination of the pipe, from one-half a cubic metre to one cubic metre, these delivering their contents into the sewer ordinarily twice in twenty-four hours. The fall of these sewers can, with this aid, be made as slight as 5mm. and even 2mm. per metre, without involving the risk of obstruction by deposits. The average velocity of the flow of these sewers varies from 0.60m. to 0.50m. The fear of such obstructions occurring in pipes of such small size is not justified. Experience of several years proves — but such proof was not necessary—that as the house-drains have a diameter of only ten centimetres, they serve as strainers to hold back objects which might cause obstructions in the larger sewer.

Of course it would be better to connect with Waring's sewers only such houses as are supplied with drains and soil-pipes 0.10m. in diameter, but there is no reason why we may not also connect with houses in which the soil-pipes are much larger, provided all inlets into these soil-pipes from water-closets and elsewhere are sufficiently reduced, and if these soil-pipes are continued above the roofs of the houses and left open at the top. With these sewers it is not necessary to use water-seal traps separating the house-drain from the sewer. In this manner we avoid obstructions to the free flow of the drainage, and the occasion for the deposit of azotized matters. All that is susceptible of putrefaction is immediately removed, and the air circulates and renews itself always in the sewers and in the house-drains.

With Waring's system it is no longer a matter of interest to secure a reduction of the quantity of water used in the house. All that is required for any purpose can and ought to be discharged into the sewer. The greater the amount of water used in a house the better. It is only necessary that storm-water, which causes enormous variations in the discharge, should be absolutely prevented from entering these sewers.

It may be asked, however, what is the minimum quantity of water per person and per day which extreme cases would suffice to insure the operation of the system. Experience has demonstrated that a consumption of water, per head, of three litres in the water-closet and twelve litres in other uses of the household — that is, fifteen litres altogether—will secure the complete transportation of fæcal matter in the sewers. Flush-tanks of one-half a cubic metre, each discharging twice a day for each two hundred of the population would add 5 litres of water to the consumption, which raises the whole necessary quantity per day to 20 litres per person. If we estimate that the average dejections of each person are represented by 2.9 litres, of which one-eighth is solid matter, and seven-eighths liquid, the transportation of these solid matters in the sewers will, in this extreme case, be effected by the flow of eighty-four times their volume of water.

What is to be done with these azotized matters thus removed from the centre of population? Mr. Waring has not given us his advice on this subject, but it is quite certain that they can either be discharged into water-courses or utilized for agriculture. The fact that they remain always diluted in about the same proportion of water, has its importance, whatever is their ultimate destination.

It may be asked why Waring's system has not already been applied on a large scale in many cities. Permit me, gentlemen, to call your attention to the fact that this system in its entirety was not invented (*n'a été imaginé*) until 1880, and that it was at once well received in the United States of America. After Memphis, Tenn., which has about 68 kilometres of sewers of Waring's system, the cities of Omaha, Neb., Norfolk, Va., and Kalamazoo, Mich., have each had constructed up to this time some 12 or 13 kilometres of sewers under the same system; the city of Keene, N. H., has already 20 kilometres. The cities of Pittsfield, Mass., and Birmingham, Ala., have already begun its construction. It is true that these are places of only from 8,000 to 40,000 inhabitants, but the city of New Orleans, La., and Baltimore, Md., with a population of 225,000 and 405,000 respectively, have also decided to adopt Waring's system, and from the last information that I have received, other important places seem about to follow the example.

Although Mr. Waring places at the bottom of the trenches in which he lays his sewers, if the soil is unduly wet, the ordinary drain-tiles, the direct rainfall is in no way admitted to the system. It is left to flow over the streets like water used for washing. For the treatment of this water it is necessary to establish according to circumstances,— that is, according to the inclination of the streets and the amount of water to be provided for, either open gutters or covered conduits.

Paris, already supplied with such a fine system of sewers, finds itself, nevertheless, still far from having satisfied the reasonable demands of the population.

In Arrondissement	I	there are about	3,400	metres of streets	without	sewers.
"	"	II	"	5,800	"	"	"
"	"	III	"	7,000	"	"	"
"	"	IV	"	8,400	"	"	"
"	"	V	"	8,000	"	"	"
"	"	VI	"	9,600	"	"	"

Making in the 6 Arrondissements 42,200 kilometres of streets without sewers.

Without continuing this enumeration of the length of streets still unprovided with sewers, permit me to recall to your minds that there are in the interior of Paris broad areas densely populated which are without a single sewer.

In Arrondissement	XVI	(Auteuil)	about 30	hectares.
"	XVIII	(Montmartre)	150	"
"	XIX	(Belleville)	50	"
"	XX	(Ménilmontant)	50	"

This, however, is not all, even supposing the 20 arrondissements of Paris to be sufficiently supplied with sewers, would that permit the suppression of privy-vaults or movable receptacles? — the first condemned by the whole world, the last losing from day to day more adherents. No: because, in order to put into execution the principle of "Everything to the Sewer," it is necessary that there should be secured, in the sewers, a permanent and rapid flow of fæcal matters, and that even in time of drought.

If, on the one hand, the enormous length of sewers remaining to be constructed in Paris requires us to seek means for their rapid and economical construction; on the other hand, the considerable extent of sewers of insufficient fall for the transportation of fæcal matter requires either their transformation, or their supplementing by economical means which will render admissible the direct discharge into them of these different substances. Waring's system applied in the first of these cases would leave the care of storm-water an open question, but would insure the *immediate* suppression of vaults; in the second case the addition of Waring's system would constitute a sufficient supplement to existing facilities to render the districts in question absolutely salubrious.

The pipe sewers of this system should, in either case, discharge into the existing sewers where there is a sufficient fall to insure the permanent and rapid removal of all fæcal matters so delivered. However rich the city of Paris may be, its Budget will not, nevertheless, permit

it to carry on the construction of this system of large sewers with the same activity as those of this new system, costing not more than the fifth part of the former. The introduction of Waring's system to the extent that I have indicated, will permit of the suppression of vaults in all the poorer and most populous quarters of Paris, which are now deprived of all but a few central sewers. It is only by thus suppressing the causes of the evil that we shall be able to abolish those epidemics which have given Paris such an unfavorable position as to death-rate as compared with other great cities. We must not, however, confine our improvement to the limits of the city proper. The miasm does not respect these lines of demarcation. The agglomerations of population in the suburbs of Paris require also to have their sanitary condition improved. I will cite only the zone outside of the walls on the northwest of Paris, which extends from Neuilly to Clichy, comprising Villiers, Courcelles, Lavalles, Champerret and Lavallois-Perrel, and which, with an area of about 800 hectares lying between the fortifications of the Seine and between the Avenue du Boule and the Western Railway has, including the two great *collecteurs*, only about 6 kilometres of sewers.

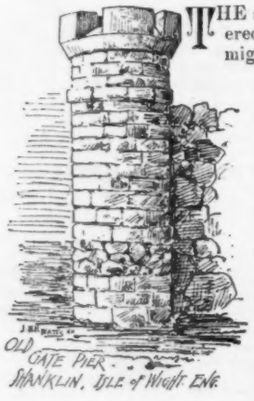
You observe, gentlemen, that if Waring's system is, in itself, a means for improving the healthfulness of a city, it is also an economical means for completing the existing system of sewerage, and it is for this reason that I hope that you will decide to adopt it; causing sewers to be built according to this system inside of large sewers of insufficient inclination in certain streets, and by filling with complete net-works of the same construction the great gaps that I have had the honor to indicate.

The immediate consideration of the storm-water question is not, in fact, of great importance, either in the region about Auteuil, where the greater part of the houses are surrounded by gardens, nor in the districts of steep inclination, such as Montmartre, Belleville and Ménilmontant."

After the discussion which followed the reading of the above paper, this resolution was adopted: "Before giving its opinion on the availability of Waring's system, the Second Sub-Commission would like to see made an experiment of special sewerage for water-closet matters and household waters under conditions analagous to those that Mr. Waring has indicated as applied at Memphis, and to charge him with the execution of this experiment, as the undertaker of the work, in a quarter of Paris.[1]"

In pursuance of this resolution the authorities have given to The Drainage Construction Company of Boston, owning the Waring patents, an order to lay special sewers inside of the large storm-water sewers, and to rearrange the interior drainage of about one hundred houses connected therewith. The sewers are to be constructed at the cost of the city, and the house-drainage and connections at the cost of the owners, the latter in consideration of a remission of sewer taxes for five years, which will be sufficient to cover all necessary outlay. The district selected will probably be the Rue des Saints Pères and adjoining streets. The population served will be from 7,000 to 10,000.

BRICKWORK IN COMPRESSION.



THE subsidence or failure of lofty chimneys, erected for chemical works and factories, might profitably suggest the importance of collecting data relative to the highest direct pressure which shafts of masonry and brickwork actually sustain with safety. The effect of wind on a lofty chimney is to intensify the pressure on one side, a condition which ought not to be overlooked in the construction of such shafts. Undue pressure may also be caused by settlements, expansion by heat, etc. We have little trustworthy information bearing upon the question of pressure actually sustained at the bases of lofty buildings, such as chimney-stalks. The great chimney at Edinburgh is 341 feet in height, it rests on a hard clay shale, and its base 40 feet square, makes, according to one authority, a pressure amounting to 2½ tons per square foot. The brick shaft above the stone pedestal exercises a pressure at the base of 8 tons per square foot, while the strength of ordinary brick has been estimated at 20 to 30 tons per square foot. Mr. C. Cowper, quoted in Dr. Downing's "Elements of Construction," furnishes a few other examples. The chimney at Adkins's Soap Works, near Birmingham, is 312 feet high, and the pressure on the base is 6 tons per square foot, and on the foundation below the footings, 1½ tons per square foot. This chimney was reduced in height from the corrosion of the brick at the top caused by the muriatic acid which escapes. The chimney at the Lap-welded Tube Works is 145 feet high, and the pressure at the base is calculated at 8½ tons per square foot of the hexagonal base. A glass-house cone 75 feet high had 4 tons per foot on the piers between the arches, which is thought as much as should be allowed where the brickwork is exposed to great heat. The great chimney of St. Rollox, near Glasgow, is 455 feet high, and is 41 feet diameter at the base, diminishing to 13 feet at the summit. So long as the pressure is not greater than one-twelfth of the ultimate resistance of the material, there need be little anxiety felt; but accidental causes, such as wind, leaning from a yielding foundation, and settlement may bring the pressure on some portion of the beds to within a limit at which the structure would not be safe. Inferior bricks are often used in construction of this kind, and when these are used in the foundations or base, the margin of safety becomes considerably diminished. In the oversetting tendency of wind on a high pile of brickwork, the pressure is suddenly shifted to one side, the leeward, and if the resultant approaches the outer face of the work, the pressure may be so increased as to cause a bulging or crushing at the joints, such as the Bradford chimney disclosed. In calculating the pressure of the wind upon a circular shaft, only one-third of the effect produced on a plane surface of the same vertical section must be taken, and this force is found to act at a centre of pressure taken at half the height of the shaft. Of course, against this moment or overturning force there is the weight of the brickwork, multiplied into the radius of the base. The smaller the diameter of the shaft, the greater is the pressure sustained on a certain unit or square foot of the base, and the greater is the rocking tendency; also the less active power is there to counterbalance the pressure of external forces like wind. To load, therefore, a small base, the builder ought to use the utmost care in selecting the truest and hardest bricks, in equally distributing the pressure, and in providing against lateral forces like the thrust of an arch, which can only produce an uneven compression and tend to produce failure. These observations extend to all brick and masonry structures which rest on small areas, such as towers, columns, piers, chimney-shafts, and lofty walls. Of course, by widely spreading the footings, the pressure can be diminished generally to within very safe limits; but as a rule it will be found the highest direct pressure occurs just above the base — a point where the closest supervision is needed in seeing that sound, hard, bricks and good mortar are employed in the construction.—*The Building News.*

[1] Avant de donner son avis sur la convenance du Système Waring, la 2me Sous-Commission désirerait voir faire un essai de canalisation spécial pour les vidanges et les eaux ménagères dans des conditions analogues à celles que lui a indiquées M. Waring comme appliquée à Memphis, et de le charger de realiser cet essai, à titre d'entrepreneur, dans un quartier de Paris.

CUBING TO OBTAIN APPROXIMATE ESTIMATES.

No. 717 Walnut St., Philadelphia, Pa.

To the Editors of the American Architect: —

The attention of students in the profession is called to a matter which may properly be said to belong to office superintendence, and which, viewed in several lights, is of great importance. The practice of making calculations upon the cubical contents of projected buildings, by taking a fixed rate and making certain allowances, is well understood. The practice as it stands is forcedly empirical, and must remain so essentially, only it is thought that it might be made more satisfactory by the adoption of some system of comparisons that will give a fairer average rate. A sufficiency of material exists, stored in the drawings and notes of work done, say, in the last two years, which, if collected and placed in tabular form, and added to with notes of future work, will be found useful in various ways, being especially valuable as a journal of office work, besides an assistance in making out appropriate estimates.

Set down: —

1. Title of the building; for whom erected; where located.
2. Name of the builder, working by contract or day's labor.
3. Material and nature of the work.
4. Dates of commencement and finishing.
5. Total cost, exclusive of architect's fees.
6. Contents in cubic feet.
7. Cost per cubic foot.

This regular formula to be filled up for all buildings of whatever description, and to it may be added, *ad libitum*, according to requirements, special extra notes describing synoptically the heating, plumbing, any particular utilitarian or decorative features, and giving the cost of each item. It is suggested that, in connection with its very valuable price-lists of supplies and labor, and building intelligence, the *American Architect* might publish certain data of this kind relating to the various extensive buildings erected annually throughout the country, which would give material aid to students in prosecuting the study of the all-important subject of intended costs; and such information could not fail to be of use to practising architects. This suggestion is offered with deference; and should these remarks provoke discussion, the object of the writer is attained. Very respectfully,

Adrian Worthington Smith.

[If any examples of the estimates obtained by cubing should be sent us they would unquestionably find a place in our columns. Contributors of drawings for publication might increase the too meagre interest of their descriptive text by giving the actual cost per cubic foot. — Eds. American Architect.]

HYDRAULIC BRICK-MACHINES.

To the Editors of the American Architect: —

Dear Sirs, — Can you tell me at what points in this country brick-machines operated by hydraulic power are located? B.

[The only makers that we feel sure employ these machines are the Hydraulic-Press Brick Co., 411 Olive St., St. Louis, Mo. —Eds. American Architect.]

AN EXPLANATION.

Boston, April 9, 1883.

To the Editors of the American Architect: —

In repairing and restoring, and, to a limited extent, enlarging my house at Waltham, the architects, Messrs. Hartwell & Richardson, had so much work to do that "rebuilding" may be expressive, in a certain way, of what was done, but what you say in your past number (April 7), when referring to the illustrations of the house, is fundamentally incorrect, and will be thoroughly misleading to those who are not familiar with the work that has been done.

"To rebuild on the original spot" implies a taking down which did not take place, and "retaining certain rooms" is not an appropriate expression, because *all* the main rooms of the old house, on both parlor and chamber stories, are the same as they were, in their divisions and in much of their finish, except as modified by the bay-windows, which were added to break the front, which, by raising the whole house from its foundation two or three feet, and changing the low attic into a square story, had become considerably higher.

Several of the chief rooms are precisely as they were, and all through the house the best of the old interior finish is preserved. The ground plan is of the same size as before, in fact, in all its essential features, the house is but little changed. The circular porch in front in place of a comparatively modern square one is a restoration, and so are a few other minor changes within and without.

As so much pains was taken, by ourselves and by the architects, to preserve and restore the old house, I feel desirous of doing away with the impression that the house was razed to the ground, and that only a few relics have been preserved.

I wish to add that most admirable work was done by Messrs. Hartwell & Richardson, not only in improving the accommodations of the old house, but in extending through it delightful details of interior finish, and in adding several features of great value and beauty.

Yours respectfully, Arthur T. Lyman.

THE PROPORTION OF CHANCEL TO NAVE.

Galt, Ont., April 11, 1883.

To the Editors of the American Architect: —

Dear Sirs, — Would you please inform me through the next issue of your valuable paper, whether there is any particular proportion of the chancel to the nave in an Episcopal church, as a gentleman said that he thought that a third of the length of the nave should be the length of the chancel, and I did not think that there was any particular proportion.

Yours truly,

F. W. Mellish.

[A very common way in modern Episcopal churches is to make the chancel a square, that is, with the depth equal to the width of the clerestory. If the chancel is to have an apsidal end, the semicircle or semi-octagon should be in addition to the square. — Eds. American Architect.]

NOTES AND CLIPPINGS.

Air-Proof Cement. — C. Pascher finds that the only substance which is really efficacious for rendering cements unalterable by the air, is a cold solution of one part of sulphate of iron in three parts of water. The cement articles are left in the solution for twenty-four hours; at the end of this time they take a greenish-black tint, due to the hydrated protoxide of iron. The absorbed solution is decomposed in the interior of the cement; the weight of the cement is increased ten per cent; all the pores of the mass are thus stopped by the hydrate, and as this combination is not attacked by the air, the cement itself becomes unalterable. Cement facings may be whitewashed with several coats of the solution. After drying the cement may be covered with a wash of ochre, or by a solution of ten per cent of sulphate of alumina in three parts of water. For a greenish-white coating, the surface may be first washed with a solution of chrome alum and then with soapsuds. Either of these coats may be painted in distemper. When oil colors are used upon naked cement they easily scale off. This inconvenience may be avoided by washing the cement with soapsuds, letting it dry, and rubbing with a brush or linen cloth until the surface shines. — *Chronique Industrielle.*

Mr. J. P. Sedding on Young Designers. — In concluding a lecture Mr. Sedding deprecated the practice of calling upon young men to design. He never encouraged a young man to design at all, because he believed it to be against his own best interest and the interest and honour of art that he should trade on insufficient knowledge, or make a call upon a personality which is only in embryo. Why, he could not render the great qualities of a great thing, even if he tried to copy it, any more than a strumming school-girl could play Beethoven! What was the good of a young architect spinning thoughts out of brains whose fibres were not equal to the strain of weaving? Let him rather, like the novice in a monastery, learn to keep silence — yea, even from good words. Let him, during a long novitiate, learn the real nobility of his high calling. Let him read his Ruskin; plod patiently on in the modelling class; let him learn the true principles of design; study the best principles; train his hand, his soul, his imagination; let him go to concerts, read poetry, prose, and romance, and combine with this all that he can possibly cram up of the history and composition of glue, of the newest electric light, the choicest method of laying drains and ventilating them with imperial self-acting exhaust ventilators, and know all about warming and acoustics and girders; let him draw and study flowers, foliage, animals, men, birds, trees, rocks, glaciers: let him seek to gather all that is "fair and fit" in all creation, but let him not design.

Discovery of a Coptic Church at Thebes. — At the last sitting of the Académie des Inscriptions et Belles-Lettres, a communication was read from M. Maspero, director of the Boulak Museum at Cairo, relating to the discovery on the site of old Thebes of a Copt church, dating from the fifth century. It appears that in the course of some excavations made by him last year, M. Maspero unearthed at the bottom of a tomb a limestone sarcophagus covered with inscriptions. Circumstances prevented its removal at the time, but in January last the spot was revisited and, while the necessary preparations for moving it were being carried out, the explorer caught sight of a fragment bearing a half-effaced inscription in Coptic. Further researches were commenced and speedily resulted in turning up several pieces of tile-work (*ostraca*), likewise covered with characters. Three days' further work sufficed to lay bare the church in question. Access to it is gained by a descending flight of five steps in brick; the floor is paved, and the walls, which are constructed of brick and white plaster, bear numerous inscriptions in several languages. To the left of the steps on entering is a large framed slab of stone, plastered over and containing in red ink, the brilliancy of which seems unimpaired, what is evidently the conclusion of a sermon in Theban Greek denouncing the Monophysite heresy. On the opposite side are the remains of another slab of similar kind, and other fragments bearing the teaching of Cyril of Alexandria on the nature and attributes of Christ, portions of sermons on the virginity of Mary the mother of our Lord, upon the doctrine of the Trinity, etc.; while the walls of the grotto are almost covered with *proscynèmes* (devout exclamations) in Copt, Greek, and Syriac, addressed to Saint Epiphany, Saint George, and Saint Phœbammon. M. Maspero evidently attaches considerable importance to these discoveries, for he has undertaken to keep the Academy posted up in the results of the further excavations hepurposes undertaking in the neighborhood of the spot. — *The Architect.*

A large elm tree at Norwich Town, Conn., has moved a house one foot from its original position. The tree is more than seventy years old and the trunk reaches a height of thirty feet before a limb branches out.

Solid and Hollow Iron Columns. — A confusion of ideas is sometimes found among practical men respecting the comparative strength of solid and hollow pillars. One hears it often said, for instance, that a hollow pillar is stronger than a solid one. Now this is, as one able authority has pointed out, not absolutely the case; it is perfectly true, that comparing the strengths of two pillars of the same height and diameter, one solid and the other hollow, that the latter has the advantage of being economically stronger. The fact is, the solid column is stronger than the hollow of the same external diameter; but the lesser area is more effective than the greater, because the central portions of the solid pillar are less useful in resisting the bending force than the metal in the circumference of the hollow pillar. But if the quantity of material in both the solid and hollow pillar of equal height is the same, the hollow pillar is by far the stronger. A simple geometrical construction will enable any one to understand this fact, by enabling us to proportion a hollow column of the same area as that of a solid one, by one of the diameters being given. It is shown, in fact, that hollow columns of the same area of metal as a solid one, may be made to any larger diameter, their strengths increasing proportionately till a limit is reached by the shell of the metal becoming too thin to insure a sound casting. Taking an example from Downing's work, a hollow pillar 9 inches in external diameter, having an internal diameter of 8.062 inches, and a thickness of metal of .47 inches, or about one-half-inch is five and one-half times stronger than a solid pillar with the same quantity of metal. A thickness of one-half-inch may be regarded as a practical limit in manufacture. — *The Building News.*

The Pitch Lake of Trinidad. — I visited the so-called Pitch Lake, Trinidad, September 30, 1882, landing per steamer at La Brea, on the west coast of Trinidad, about forty miles south of the port of Port-of-Spain. The lake in question is situated about one and one-half miles from the shore. There is a gentle ascent of 140 feet from the shore to the lake. The name "lake" is a misnomer, if we understand by the term a cavity containing a liquid. The contents of this cavity, or supposed cavity, is a concrete, slightly flexible mass of pitch; it is a level plain, on which bushes, and patches of vegetable formations, and pools of water are seen here and there over the surface. There is no difficulty in walking or wading over it from end to end, or from side to side. The shape of this plain is a sort of ellipse or ovoid. The water in the pools is rain-water, having a slight iron taste. Arriving on the plateau I found, first, a number of chestnut-colored females washing and bleaching linen, and in other parts a number of two-wheeled carts, drawn each by a single horse, in the act of being loaded with pitch. Scattered here and there over the surface were to be seen dark, yellow-brown colored men with pickaxes digging out large clods of pitch, which boys gathered out from the pit and piled up for the carters. The pitch at almost every blow of the pickaxe broke off with a resinous fracture quite easily. Each lump of pitch exhibited air cavities of the size of a pigeon's egg, larger or smaller. I was informed by the diggers that they never dig deep enough to find the pitch soft and plastic; but they asserted that in the course of a couple of days the cavity which they had dug would be again level with the surrounding plain. This assertion, I think, must be taken with considerable reservation. This pitch deposit, I imagine, like any other mineral deposit, will become entirely exhausted in the course of time, resembling in this respect our oil wells in Pennsylvania. But it will take a long time to do this, for the area of this visible deposit is about 100 acres, which is equivalent to 4,360,000 feet, and 4,360,000 feet surface and one foot deep will give the same number of cubic feet. Now, allowing the weight of one cubic foot of pitch to be 60 pounds (it is really more), we shall get by computation 261,360,000 pounds, which number divided by 2,240 gives 116,678 tons for the weight of a single layer of pitch on Pitch Lake one foot deep. How deep this pitch deposit is absolutely is not yet known with accuracy, or even approximately. — *U. S. Consul Towler's Report.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

275,346. Holder for Mortising-Chisels. — Geo. W. Amesbury, Philadelphia, Pa.

275,369. Hydraulic-Cement Compound. — Edward J. De Smedt, Washington, D. C.

275,381. Solvent for Paints, Oils and Varnishes. — Jas. A. Henry, Platteville, Wis.

275,403. Compasses. — Jacob Neimeyer, Atlantic, Iowa.

275,409. Heating-Device. — Jas. D. Potter, Portland, Me.

275,414. Saw-Handle. — William W. Richardson, Indianapolis, Ind.

275,421. Derrick. — John T. Scully, Cambridge, Mass.

275,456. Sash-Holder. — John M. Baldwin, Sidney, N. J.

275,467. Brick-making Machinery. — Cyrus Chambers, Jr., Philadelphia, Pa.

275,477. Brick and Tile Kiln. — Jesse L. Friend, Perrysburg, Ind.

275,492. Blind-Stop. — Joshua Hunt, Providence, R. I.

275,507. Composition for Roofing, etc. — Nathan McCoy, Manchester, N. H.

275,514. Fire-Escape. — James Pappa, Oswego, N. Y.

275,533. Door-Latch. — William E. Sparks, New Britain, Conn.

275,538-539. Bench-Plane. — Levi C. Strong, Albany, N. Y.

275,540. Derrick.—Geo. W. Tarr, New York, N. Y.

275,559. Hand-Saw Attachment. — Henry Winter, Hanover, Ill.

275,573. Awning-Frame. — Geo. Borst, Rochester, N. Y.

275,574. Device for Feeding Air to Furnaces. William J. Bradshaw and William W. Cowley, Cleveland, O.

275,585. Apparatus for Heating and Ventilating Rooms. — Angus K. Campbell, Newton, Io.

275,597. Planing-Machine. — Henry J. Cordesman, Jr., and John R. Thomas, Cincinnati, O.

275,608. Fire-Escape. — Warren W. Drake, Girard, Ohio.

275,647. Portable Elevator. — Joseph T. Haines, Balbec, Ind.

275,656. Pneumatic Alarm-Lock for Jails. — Isaac Hodgson, Indianapolis, Ind.

275,658. Fire-Escape. — Edwin J. Howe, Newark, N. J.

275,796. Fastener for the Meeting-Rails of Sashes. — Andrew M. Rantz, Cambridgeport, and Chas. L. Engelhardt, Boston, Mass.

275,716. Water-Closet Cistern. — William Scott, Faulkner, Mass.

275,726. Attachment for Inside Doors. — John Smith and John P. Rhodes, Rockville Centre, N. Y.

275,731. Fire-Extinguisher. — George W. Taylor and Abner R. Cox, Belton, S. C.

275,752. Fire Extinguisher and Alarm. — Chas. E. Buell, New Haven, Conn.

275,755. Sink. — Wm. W. Elliott, Reading, and Wm. J. Towne, Newton, Mass.

275,757. Steam-Radiator Attachment. — Geo. Engel, Buffalo, N. Y.

275,772. Fire-Escape. — Jos. B. Kennedy, Princeton, Ind.

275,778-779. Fastener for Meeting-Rails of Sashes. — Michael W. Mahar, National Military Home, Ohio.

275,785. Vault-Cover. — Elhanan Omensetter, Philadelphia, Pa.

SUMMARY OF THE WEEK.

Baltimore.

Store and Dwelling. — W. F. Weber, architect, is preparing drawings for Jas. A. Wilson, Esq., for a four-st'y brick store and dwell., with stone finish, 18′ x 43′, to be built at 72 North Eutaw St., and to cost $3,809.

Rectory. — Mr. Geo. A. Frederick, architect, is preparing drawings for a three-st'y brick and stone rectory, 37′ x 40′, for the Church of the Holy Martyrs, to be built cor. Mount and Lombard Sts., and to cost $7,000.

Additions and Alterations. — A. S. Abell, Esq., is about to have built a four-st'y brick and marble addition, 20′ x 58′, to his residence, cor. Charles and Madison Sts., and to erect an additional story to the present structure, besides alterations, from designs by Geo. A. Frederick, architect; cost, $30,000. The same architect is preparing plans for the alteration of the dwelling of Mrs. Kerr, South Sharp Street, to stores.

Building Permits. — Since our last report fifty-nine permits have been granted, the more important of which are the following: —

J. Herget, two-st'y brick building, s e cor. O'Donnell and Curley Sts.

Merchants' and Mechanics' Permanent Building and Loan Co., 5 three-st'y brick buildings, e s Gravel Alley, between Franklin and Centre Sts.

Elizabeth Lambla, 5 two-st'y brick buildings, w s Towson St., between Beason and Clement Sts.

Johns Hopkins Hospital, five-st'y brick and iron warehouse, s e cor. Light and Water Sts.

John Q. Coding, 14 three-st'y brick buildings, e s Fulton St., between Baltimore St. and Frederick Road, and a three-st'y brick building, s s Baltimore St., e of Fulton St.

Wm. H. Olen, two-st'y brick stable, 176 West Falls Ave.

Wm. Schaffell, three-st'y brick building, s e cor. Chase and Hillman Sts.

Frederick Burger, 2 two-st'y brick buildings, s s Baker St., between Division St. and Pennsylvania Ave.; also, 3 three-st'y brick buildings, s s Fairmount Ave., s e cor. Castle St.; also, two-st'y brick stable and 3 two-st'y brick buildings, e s Castle St., s of Fairmount Ave.

Samuel T. Edel, 2 three-st'y brick buildings, e s Harford Ave., between Preston and Biddle Sts.

T. W. M. Crook, three-st'y brick stable and dwell., in rear of e s Paca St., between Lexington and Fayette Sts.

Henry Wicks, two-st'y brick building, w s Port Alley, between Aliceanna St. and Canton Ave.

L. H. Robinson, 3 three-st'y brick buildings, w s Mount St., s of Lanvale St.; also, two-st'y brick carpenter-shop and two-st'y brick building, e s Bruce Alley, s of Lanvale St.

Miss Betty Meyer, 2 three-st'y brick buildings, e s Gay St., between East and Chestnut Sts.

Dr. H. P. C. Wilson, three-st'y and mansard brick building, w s Park Ave., between Madison and Richmond Sts.

Boston.

Annual Report of Inspector of Buildings. — The following items are taken from the annual report of the Inspector of Buildings of the City of Boston: —

During the year 1882 there were 235 permits granted for brick, stone and iron buildings; 838 permits for wooden buildings; 23 special permits for wooden buildings within the building limits; and 2,205 permits for additions, alterations and repairs.

There were 238 brick buildings completed during the year, at an estimated cost of $4,932,640, on which final reports were rendered; of wooden buildings there were 788 completed, and a cost of $2,379,278; and 2,263 additions, alterations and repairs were made, at a cost of $1,607,051.

395 buildings were damaged by fire, at a total loss to buildings of $186,372.

Building Permits. — *Brick. — Orchard St., No.* 41, Ward 20, for Nathan A. Wilbur, dwell., 30′ x 30′ and 34′, three-st'y flat; Nathan A. Wilbur, builder.

Endicott St., No. 180, *and Endicott Ct., No.* 12, Ward 7, for John O'Connor, dwell. and store, 16′ and 18′ 6″ x 36′ 6″ and 44′, four-st'y flat.

West Chester Park, No. 187, Ward 18, for David H. McKay, family hotel, 60′ x 80′, six-st'y flat; D. H. McKay, builder.

Oliver St., No. 91, Ward 12, for A. W. Stetson, store, 23′ 7″ and 24′ x 48′ 6″, four-st'y flat; G. W. Pope, builder.

Eustis St., No. 214, Ward 20, for the E. Howard Watch & Clock Co., dry-house, 32′ x 63′, one-st'y flat; D. H. Jacobs & Son, builders.

Clark St., Nos. 28 *and* 30, Ward 6, for Patrick Canny, dwell., 26′ 5″ x 30′, four-st'y flat; Dennis Sullivan & Son.

Wood. — Lexington St., Nos. 236 *and* 238, Ward 1, for James Frame, 2 dwells., 21′ 6″ x 32′, two-st'y mansard; Frame & Patten, builders.

Walnut Ave., No. 171, rear, Ward 21, for Harrison G. Hunt, stable, 20′ x 27′, one-st'y pitch; Isaac Sprague, builder.

Boylston Ave., near Boylston St., Ward 23, for Abraham Bell, coal storage, 20′ x 40′, one-st'y flat; A. A. Ayers, builder.

Chestnut Ave., near Spring Park Ave., Ward 23, for Frederick Koop, 22′ x 36′ and 13′ x 17′, two-st'y pitch; Jacob Luippold, builder.

Clifford St., No. 18, Ward 21, for Geo. Davis, dwell., 22′ x 32′, two-st'y pitch.

Rossiter St., near Eldon St., Ward 24, for Hazard Stevens, dwell., 26′ 6″ x 32′, one-st'y mansard; Samuel T. Waters, builder.

Unnamed St., cor. Ellery St., Ward 15, for Wm. T. Abbott, 7 dwells., 17′ x 36′, two-st'y mansard; Jas. F. Smith, builder.

Wyman St., cor. Gilbert St., Ward 23, for John L. Dakin, dwell., 30′ and 35′ x 38′, two-st'y hip; John L. Dakin, builder.

K St., cor. East Eighth St., Ward 14, for Ellen P. Rich, 3 dwells., 13′ x 19′ and 20′ x 30′, two-st'y mansard; D. A. Berry, builder.

Paris St., Nos. 108 *and* 110, for Thomas McKenley, skating-rink, 100′ x 137′, one-st'y flat; A. & J. McLaren, builders.

East Sixth St., near O St., Ward 14, for Phelix Smith, hotel, "Grant House," 40′ x 50′ and 46′ x 65′, two-st'y flat; John Harrison, builder.

Wayne St., near Blue Hill Ave., Ward 31, for H. A. Wood & J. F. Wetherbee, 2 dwells., 28′ x 39′ and 13′ 6″ x 18′, two-st'y pitch; Wood & Wetherbee, builders.

Dale St., near Walnut Ave., Ward 21, for Wm. Donaldson, dwell., 21′ x 31′ and 15′ x 15′, two-st'y pitch; Wm. Donaldson, builder.

Dunstable St., near Main St., Ward 5, for Reed Bros. & Sawin, stable, 30′ and 35′ x 68′, two-st'y flat; A. B. Perham, builder.

Elm Hill Ave., near Crawford St., Ward 21, for John F. Blinn, dwell., 36′ x 38′ 8″ and 17′ 8″ x 24′ 6″, two-st'y hip; B. D. Whitcomb, builder.

Bennington St., Nos. 190 *and* 192, Ward 1, for Joseph Perry, dwell., 20′ x 40′, three-st'y flat; Charles E. Day, builder.

Saratoga St., near Moore St., Ward 1, for Edwin J. Turner, dwell., 20′ x 30′, one-st'y pitch; Edwin J. Turner, builder.

Geneva Ave., near Blue Hill Ave., Ward 24, for S. W. Wales, carriage-house, 30′ x 40′, one-st'y flat; Alexander Murray, builder.

Webster Ave., rear, near Brighton Ave., Ward 25, for Jacob W. Berry, dwell., 22′ and 34′ x 34′, one-st'y pitch; Jacob W. Berry, builder.

Davis St., rear, near Porter St., Ward 1, for Neil E. Campbell, stable, 38′ x 50′, two-st'y flat; Leonard Pickering, builder.

Shamrock St., near Dorchester Ave., Ward 24, for Patrick Finnegan, dwell., 22′ x 32′, three-st'y flat; Michael Ryan, builder.

Commercial St., near Dorchester Ave., Ward 24, for Leander E. H. Jones, 2 dwells., 20′ x 40′, two-st'y flat.

Unnamed St., rear, opposite Dorchester Ave., Ward 24, for John Haggerty, storage, 18′ x 30′, one-st'y flat; Joseph Orr, builder.

Delle Ave., near Parker St., Ward 22, for Michael Cunningham, dwell., 24′ x 30′ 10′, and 18′ x 21′, two-st'y mansard; E. W. Bishop, builder.

West Cottage St., near Brook Ave., Ward 20, for Wm. W. Dromey, 2 dwells., 20′ x 38′, two-st'y flat; Wm. W. Dromey, builder.

Laurel St., No. 30, Ward 21, for A. Anderson, dwell., 20′ and 22′ 6″ x 33′, two-st'y hip; A. Alexander, builder.

Bearse Ave., near Butler St., Ward 24, for Walter Brown, dwell., 22′ x 30′, two-st'y hip; F. M. Severance, builder.

Dorchester Ave., No. 531, rear, Ward 15, for Michael Campbell, carriage-house, 28′ x 50′, two-st'y flat; John M. Burke, builder.

School St., Ward 5, for Aaron Hook, dwell., 21′ x 42′ and 28′ x 36′, three-st'y flat; Moses P. Bickford, builder.

Mather St., near Dorchester Ave., Ward 24, for Thomas Watson, dwell., 25′ x 33′ and 15′ 6″ x 18′, two-st'y hip; John H. Burt & Co., builders.

East Sixth St., cor. Q St., Ward 14, for Robert F. McGlynn, retaurant, 24′ x 35′, two-st'y flat; John Harrison & Co., builders.

Boston St., rear, near Clapp Pl., Ward 24, for Henry A. Griswold, stable, 30′ x 30′, two-st'y pitch.

Saratoga St., cor. Wadsworth St., Ward 1, for Thomas H. Newby, dwell. and store, 21′ x 32′, three-st'y flat; Thomas H. Newby, builder.

Warren St., near Devon St., Ward 21, for John E. Kinney, dwell., 34′ x 39′, two-st'y pitch; John H. Burt & Co., builders.

Whitney St., near Tremont St., Ward 22, for Arthur Morgan, dwell., 25′ x 38′, two-st'y mansard.

Wales St., near Blue Hill Ave., Ward 24, for Stanley D. Poole, dwell., 26′ x 38′ 6″, two-st'y pitch; John Harrison & Co., builders.

Warren Ave., near Harvard St., Ward 24, for Jas. Nesbitt, dwell., 27′ 9″ x 28′ and 13′ x 21′, two-st'y pitch; John Harrison & Co., builders.

Whitney St., No. 46, Ward 22, for James Harrigan, dwell., 24′ x 37′; three-st'y flat.

Brooklyn.

Stable. — A brick stable, two stories high, 25′ x 40′, is to be built on Clifton Place, for Mr. E. P. Loomis, from designs of Mr. Jas. M. Farnsworth, of New York.

Building Permits. — *Madison St.*, s s, 200′ e Tompkins Ave., 5 two-st'y brownstone front dwells., tin roofs; cost, each, $4,500; owner, architect and builder, Jas. A. Thomson, 300 Lexington Ave.

Marcy Ave., w s, 24′ s Heyward St., 4 three-st'y brick dwells., tin roofs; cost, each, $4,500; owner and builder, H. Grasman, 807 Willoughby Ave.

President St., s s, 80′ w Sixth Ave., 4 three-st'y brick flats, gravel roofs; cost, each, $7,000; owner and builder, I. M. Brown, 525 Quincy St.; architect, C. B. Sheldon.

On North Pier, Atlantic Dock Company, one-st'y frame storage-shed; cost, about $20,000; owners and builders, Atlantic Dock Co., 1 Hamilton Ave.

Hancock St., n s, 50′ e Bedford Ave., 3 three-st'y brownstone front dwells., tin roofs; cost, each, $8,000; owner and builder, S. E. C. Russell, 58 Hancock St.; architect, I. D. Reynolds.

Ellery St., No. 204, s s, 150′ w Throop Ave., three-st'y frame double tenement, tin roof; cost, $4,200; owner, Ernst Limmeroth; architect, T. Engelhardt, 14 Fayette St.; builders, Fuchs and H. Eich & Bro.

Floyd St., Nos. 318 *and* 320, s s, 400′ w Lewis Ave., 2 two-st'y and frame tenements, tin roofs; cost, each, $3,000; owners, Straub & Kramer, Floyd St.; architect, T. Engelhardt.

Berkeley Pl., s s, 250′ e Seventh Ave., 3 three-st'y brownstone front dwells., tin roofs; cost each, $10,000; owner, architect and builder, John Magilligan, 56 Berkeley Pl.

Floyd St., Nos. 232 *and* 234, s s, 100′ w Throop Ave., 2 three-st'y frame double tenements, tin roofs; cost, each, $4,000; owner and builder, Fred Weidner, 170 Floyd St.; architect, T. Engelhardt.

Floyd St., No. 263, n s, 150′ w Sumner Ave., three-st'y frame double tenement, tin roof; cost, $4,000; owner, Ernst Paul, on premises; architect, T. Engelhardt; builders, John Fuchs and C. Hoffmann.

Broadway, w s, 75′ n Gerry St., 2 three-st'y frame tenements, tin roofs; cost, each, $4,000; owner and builder, John Rueger, 498 Broadway; architect, T. Engelhardt.

Gwinnett St., Nos. 138 *and* 140, s s, 175′ e Harrison Ave., three-st'y double and three-st'y single frame tenements, tin roofs; cost, total, $7,000; owner, Henry Sauer, 140 Gwinnett St.; architect, Jacob Mesmer; builder, J. Shoet.

Eleventh St., s s, 288′ 5″ w Eighth Ave., two-st'y brick engine-house, tin roof; cost, $10,000; owner, City of Brooklyn; builders, Thos. Donlon and F. D Norris.

Dupont St., No. 145, n s, 275′ e Manhattan Ave., three-st'y frame double tenement, gravel roof; cost, $3,650; owner, —— Mason, 147 Dupont St.; architect, B. E. Lowe; builders, T. McHugh and J. A. Post.

Fulton St., w s, 40′ s Clark St., six-st'y brick store, gravel roof; cost, $50,000; owners, Ovington Bros., Willow St.; architect, R. B. Eastman; mason, T. B. Rutan; carpenter, not selected.

Lincoln Pl., s s, 250′ w Eighth Ave., 2 three-st'y brownstone front dwells., tin roofs; cost, total, $20,000; owner and builder, E. H. Day, 151 State St.; architect, M. J. Morrell; mason, J. J. Bentzen.